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PACKAGING WASTE COLLECTION AND PROCESSING OPTIONS IN REMOTE AND REGIONAL AREAS

AUSTRALIAN PACKAGING COVENANT ORGANISATION

Contents

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Acknowledgement of country

APCO acknowledges the Traditional Custodians of the land on which we live and work in Australia.

We pay our respects to Elders past, present and emerging, and acknowledge the ongoing connection that Aboriginal and Torres Strait Islander peoples have with Australia's land and waters.

Foreword

Providing better access to waste collection and recycling services for the almost 2.5 million people who live in the outer regional, remote and very remote areas is a priority for the Australian Government.

That is why we endorse the Australian Packaging Covenant Organisation's (APCO) work to deliver two key actions for remote and regional areas under Australia's National Waste Policy Action Plan.

This report is the first step in understanding how we can build partnerships with multiple stakeholders to improve waste collection and recycling services in regional and remote areas. No single party can do it alone. Success will require different tiers of government, industry and community organisations all working together.

The lack of waste collection, sorting and processing facilities reflects the small and dispersed populations of these communities. This means that kerbside collection and recycling schemes are simply not feasible and transport costs are considerable.

Our challenge is to drive improvement without economies of scale.

The solutions will involve partnerships, innovative technology and targeted investments.

The Australian Government is already playing its part through the $190 million Recycling Modernisation Fund (RMF) that will leverage over $600 million in new recycling infrastructure, including to support regional and remote areas.

The Australian Government has also invested to assess the viability of a plastics recycling, collection, processing and manufacturing hub in Far North Queensland. If successful, this model can provide a template for other regional communities to follow.

I am delighted that as part of its work, APCO has produced this report which identifies specific opportunities to improve how packaging waste is managed and recycled in remote and regional areas. The report will be key to informing future solutions and investments.

Trevor Evans MP
Assistant Minister for Waste Reduction and Environmental Management

Executive Summary

RATIONALE AND OBJECTIVES OF THIS REPORT

The Australian Packaging Covenant Organisation (APCO) is working to achieve the 2025 National Packaging Targets (2025 Targets) using a Collective Impact Framework. This framework recognises the critical roles played by all three tiers of government, APCO Members, the waste and recycling sector and other stakeholders.

APCO is committed to ensuring that work to deliver on supports improved management and recovery of packaging waste in remote and regional areas. This commitment is formalised through the ***National Waste Policy Action Plan***, which includes two actions that APCO is responsible for leading in partnership with all governments:

- Action 3.14: Report on opportunities to promote regional collection and recycling of soft plastics through expansion of the Regional Model for Soft Plastics.
- Action 3.15: Develop shared infrastructure and collection processes for packaging waste in remote and regional areas through the Remote and Regional Waste Collection Partnership.

The focus of this report is on developing a shared understanding of the challenges and opportunities to improve packaging waste management and resource recovery in remote and regional (particularly outer regional) areas of Australia. The objectives of the report are to:

- Provide insights into the challenges faced by communities, governments and industry in managing packaging and plastic waste in remote and regional areas of Australia.
- Provide a framework for considering the challenges and opportunities to improve management of packaging and plastic waste in remote and regional areas.
- Outline possible opportunities to support the delivery of APCO's commitments to supporting improved waste management under Actions 3.14 and 3.15 of the *National Waste Policy Action Plan*.

The report was developed through a combination of desktop research and stakeholder consultation, including representatives of governments, community groups and industry.

REMOTE AND REGIONAL COMMUNITIES

The Australian Bureau of Statistics has in place a model for classifying areas of Australia into five remoteness area classifications. A map of the five remoteness areas based on the 2016 census is shown in **Figure A** below.[1]

Figure A - Map of Australia showing the five remoteness areas based on the 2016 census

Most of Australia's population (71.3%) live in major cities, while the next largest group, 4.255 million people or 18.2% of the population, live in inner regional areas. The remaining 10.5% of the population, almost 2.5 million people, live in outer regional, remote and very remote areas[1]. The primary focus of this report is on waste management in outer regional, remote and very remote areas, while inner regional areas are considered primarily for their potential to be developed as hubs for aggregation and processing of waste.

COMMUNITY RECYCLING CHARACTERISTICS

The cost of waste collection for remote and outer regional areas is higher due to the poorer economies of scale with lower populations and the significant transport distance.

Collected recyclables are usually transported to inner regional Material Recovery Facilities (MRFs) in an uncompacted or semi-compacted form. After sorting, there is often a significant travel distance to the final reprocessing or export destination resulting in higher operational costs for recycling.

[1] Australian Bureau of Statistics, 2018, available at https://www.abs.gov.au/websitedbs/d3310114.nsf/home/remoteness+structure

POTENTIAL MATERIAL FLOWS

Table A below shows estimates of the annual weight of different packaging materials that might be recovered from remote and regional communities.

These estimates were developed by Sustainable Resource Use Pty Ltd and are based on national average material flows of 90-100 kg per person.[2]

Table A - Potential annual recycling yields for remote and regional communities (tonnes/year)

Paper & cardboard	Glass	HDPE	PET	Other plastics	Steel	Aluminium	Total
122,000	68,700	11,100	6,700	4,400	4,500	4,400	221,800

Based on the geographic distribution of population, the split of these potential annual recycling yields across communities is 179,500 tonnes from outer regional areas, 25,500 tonnes for remote areas, and 16,800 tonnes for very remote areas. The state with the largest potential recycling yield from remote and outer regional areas is Queensland, with 32% of the national total for these areas.

The data presented in Table A does not include other plastics. Sources of plastic waste in remote and regional areas include agricultural plastics such as pipes, bulk bags and crop protection films. Combining these wastes with packaging waste may enable economies of scale for collection, reprocessing and end-market development in some areas.

CURRENT APPROACHES AND GAPS

This report provides an overview of the existing programs, approaches and technologies for collecting and processing packaging and other plastic waste in remote and regional areas of Australia. Some of these are described in more detail in the 23 case studies presented in **Appendix A**.

There are a number of programs and approaches outlined within the report, which are in place to support:

Capability development, planning and governance.

Packaging waste collection

Transportation

Recycling

End markets

For each of these programs and approaches, gaps and challenges were identified, including:

- Difficulty developing and retaining local capability to operate and maintain complex plant and equipment.
- Inconsistent coverage of product stewardship schemes and other programs approaches between communities.
- Small waste volumes and consequently high costs per tonne collected.
- Significant barriers to the widespread use of reverse logistics.
- The complexity of designing and implementing programs in remote and very remote areas, including in relation to governance, timeframes and the need for capital and operational funding.

Further detail on these challenges can be found within the report.

[2] These estimates were developed by Sustainable Resource Use Pty Ltd based on analysis of data included in APCO, 2019. Packaging consumption and recycling data 2017-18 baseline data, and APCO, 2020. Our Packaging Future.

OPPORTUNITIES TO IMPROVE WASTE MANAGEMENT AND RECYCLING

Based on the stakeholder consultation and desktop analysis, a series of opportunities were identified to improve packaging waste management and recycling in remote and regional areas. These opportunities are summarised in **Table B** below.

Table B - Summary of opportunities to support improved waste management and recycling in remote and regional areas

OPPORTUNITIES IN CAPABILITY DEVELOPMENT, PLANNING AND GOVERNANCE	1. Work with regional governance groups to identify and build on successful local and regional approaches. 2. Embed staff in regions to coordinate delivery of product stewardship services. 3. Support the uptake and enhancement of training opportunities in waste management and product stewardship. 4. Consider lessons learned from the NSW Aboriginal Communities Waste Management Program as a model for developing waste management capability within communities. 5. Establish a national working group to drive product stewardship outcomes in remote and regional areas.
OPPORTUNITIES IN PACKAGING WASTE COLLECTION	6. Consider lessons learned from existing models for packaging waste collection and adapt or apply successful approaches in other communities. 7. Engage brand owners to consider providing collection facilities in remote communities. 8. Foster collaboration between product stewardship schemes to establish and maintain shared collection services. 9. Broaden existing collection systems to include other compatible materials. 10. Trial alternative packaging materials and formats for remote areas to reduce the amount of waste produced.
OPPORTUNITIES IN TRANSPORTATION	11. Establish regional hubs for aggregation of waste for more efficient transport, informed by a region-byregion analysis of material flows and availability of processing and market opportunities. 12. Consider the potential for waste transport subsidies to enable the development of regional recycling capabilities. 13. Facilitate the consolidation of different waste streams within regions for more efficient transportation and processing. 14. Conduct an analysis of barriers and opportunities for shared transportation including reverse logistics.
OPPORTUNITIES IN RECYCLING	15. Undertake further analysis of the economic and technical feasibility of local and regional recycling options based on community size and material flows, and the co-benefits of establishing local and regional recycling capability. 16. Consider the widespread installation of first stage processing equipment to increase transport efficiency and storage capacity. 17. Consider the establishment of mechanical recycling facilities in regions with sufficient material flows and potential end markets. 18. Consider the establishment of enterprises to utilise regional material flows and service regional product markets. 19. Consider the suitability of composting systems for cardboard, paper and food packaging where material recycling options are not available.
OPPORTUNITIES IN END-MARKETS	20. Support the development of standards for the use of recycled crushed glass and recycled plastics in road and other civil construction. 21. Support trial projects utilising recycled crushed glass and recycled plastics in road and other civil construction. 22. Explore options to increase the participation of remote and regional communities in whole-of-life cycle programs such as Plastic Police and REDcycle, including through regional-scale implementation.

Introduction

RATIONALE AND OBJECTIVES

In November 2019, the 2025 National Packaging Targets (2025 Targets) were formally adopted by Australia's Environment Ministers as part of the ***National Waste Policy Action Plan***. The four targets, to be achieved by 2025, are:

- 100% of packaging to be reusable, recyclable or compostable.
- 70% of plastic packaging recycled or composted.
- 50% average recycled content across all packaging, with specific targets for certain materials.
- Phase out problematic and unnecessary single-use plastic packaging through redesign, innovation or alternative delivery methods.

APCO plays a coordinating strategy-setting and administrative role to drive collaboration throughout the supply chain to meet the 2025 Targets. This is achieved using a Collective Impact Framework. This framework recognises the critical roles played by all three tiers of government, APCO Members, the waste and recycling sector and other stakeholders.

The Collective Impact Framework is set out in ***Our Packaging Future***, which establishes that one of the three critical outcomes that will drive achievement of the 2025 Targets is improved collection and recycling systems. Four strategies are in place to deliver on this outcome:

- Strategy 2.1: Standardise kerbside collection systems.
- Strategy 2.2: Expand drop-off and take back systems for packaging.
- Strategy 2.3: Improve the infrastructure for sortation and recycling.
- Strategy 2.4: Educate households and businesses to source separate effectively.

In elaborating these strategies, APCO has emphasised its commitment to ensuring that this work benefits remote and outer regional areas and not just metropolitan and inner regional areas where there are kerbside collection systems in place. While acknowledging that there may be some areas or some materials for which recycling will not generate a net environmental benefit, APCO is committed to understanding how improved management and recovery of packaging waste in remote and regional areas can be delivered.

APCO's commitment to supporting outcomes in remote and regional Australia has been further formalised through the *National Waste Policy Action Plan*. Target 3 of the *National Waste Policy Action Plan*, to achieve 80% average resource recovery rate from all waste streams by 2030, includes two actions that APCO is responsible for leading in partnership with all governments:

- Action 3.14: Report on opportunities to promote regional collection and recycling of soft plastics through expansion of the Regional Model for Soft Plastics.
- Action 3.15: Develop shared infrastructure and collection processes for packaging waste in remote and regional areas through the Remote and Regional Waste Collection Partnership.

The focus of this report is on developing a shared understanding of the challenges and opportunities to improve packaging waste management and resource recovery in remote and regional areas of Australia. It takes a holistic view, considering institutional, economic and technical aspects and the importance of building on existing initiatives and capabilities through a partnership approach.

The objectives of this report are to:

- Provide insights into the challenges faced by communities, governments and industry in managing packaging and plastic waste in remote and regional areas of Australia.
- Provide a framework for considering the challenges and opportunities to improve management of packaging and plastic waste in remote and regional areas.
- Outline possible opportunities to support the delivery of APCO's commitments to supporting improved waste management under Actions 3.14 and 3.15 of the *National Waste Policy Action Plan.*

HOW THIS REPORT WAS DEVELOPED

This report was developed through a combination of desktop research and stakeholder consultation, included representatives of the Commonwealth, state, territory and local governments, community groups, the waste and resource recovery industries, APCO Members and partners, and other subject matter experts.

The desktop research focused on:

- Developing an understanding of the context of waste management in remote and regional areas, including an analysis of demographics and material flows.
- Developing a broad overview of existing programs, approaches and technologies for collecting, transporting and processing packaging waste in remote and regional areas of Australia.
- Providing more detail on representative examples of programs, approaches and technologies through case studies.

The consultation process was used to:

- Test the initial findings of the desktop research, identify gaps in coverage and subjects for case studies.
- Gain insights into the challenges and opportunities to improve waste management and processing in remote and regional areas.

The analysis undertaken through these processes was focused primarily on packaging, including business-to-consumer and business-to-business packaging. Other plastic wastes (non-packaging) were also considered where their inclusion was relevant to or would be likely to support possible solutions for packaging waste, for example where agricultural plastics could be processed along with packaging plastics to enable economies of scale. The analysis was also focused on remote and outer regional areas, which are the areas most likely to face the greatest challenges and the least likely to have access to kerbside collection systems. Inner regional areas are also an important part of the picture for remote and regional waste management, and are considered particularly in relation to the establishment of hubs for aggregation and processing of waste.

The findings of the analysis are presented as:

- An overview of the demographic and material flow context of remote and regional areas.
- A high-level overview of the current status of waste management in remote and regional areas.
- Case studies.
- An analysis of common challenges, needs and opportunities.
- Options to work towards improved outcomes.

Remote and regional communities

COMMUNITY REMOTENESS CLASSIFICATIONS

This section of the report describes the characteristics of regional and remote communities in relation to waste management and recycling.

The Australian Bureau of Statistics has in place a model for classifying areas of Australia into five remoteness area classifications. The remoteness areas are determined on the basis of a measure of relative distance to service centres – the Accessibility and Remoteness Index of Australia (ARIA+). A map of the five remoteness areas based on the 2016 census is shown in **Figure 1** below.

Figure 1 - Map of Australia showing the five remoteness areas based on the 2016 census

[3] Australian Bureau of Statistics, 2018, available at https://www.abs.gov.au/websitedbs/d3310114.nsf/home/remoteness+structure

Table 1 below shows the distribution of Australia's population within the five remoteness classifications. This shows that most of Australia's population (71.3%) live in major cities, while the next largest group, 4.255 million people or 18.2% of the population, live in inner regional areas. The remaining 10.5% of the population live in outer regional, remote and very remote areas.[4]

Table 1 - National population by remoteness classification (from 2016 census)

State/Territory	Population	Percentage of total population
Major cities	16,682,391	71.3%
Inner regional	4,255,381	18.2%
Outer regional	1,994,704	8.5%
Remote	282,892	1.2%
Very remote	186,461	0.8%
Total	23,401,829	100%

This report focuses primarily on the following community types, which most commonly lack access to kerbside recycling services:

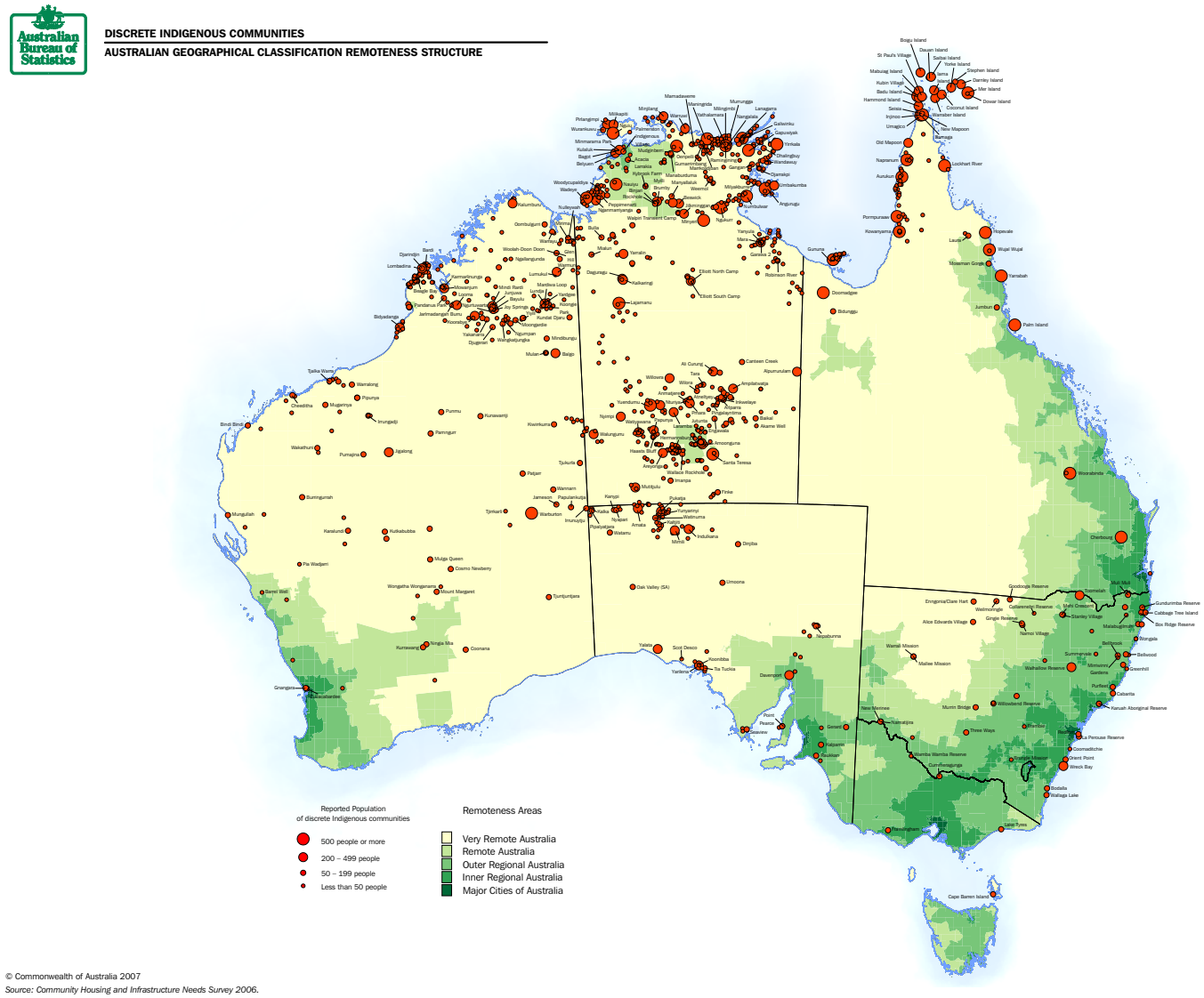
- Outer regional.
- Remote.
- Very remote.

Outer regional areas are characterised by small provincial cities and larger towns servicing their surrounding communities. Their distance from capital cities is typically in the range from 100 km to 500 km but is much greater in North Queensland.

Remote areas are characterised by smaller townships supporting agriculture, mining or tourism activities. Their distance from capital cities is typically in the range from 200 km to 700 km. Very remote areas have a combined population of less than 200,000. These are located in inland areas across Western Australia (WA), South Australia (SA), the Northern Territory (NT), New South Wales (NSW) and Queensland and some islands.

One important feature of remote and outer regional areas is that they include most, though not all, of Australia's Indigenous communities. **Figure 2** shows a 2007 remoteness area map with reported populations of discrete Indigenous communities.

[4] Australian Bureau of Statistics, 2016. 2916.0 - Census of Population and Housing - QuickStats, Community Profiles and DataPacks User Guide, Australia, 2016. Available at https://www.abs.gov.au/ausstats/abs@.nsf/Lookup/2916.0main+features102016



Source: Community Housing and Infrastructure Needs Survey 2006.

Figure 2 - 2006 Remoteness Area map with reported populations of discrete indigenous communities.[5]

[5] Commonwealth of Australia, 2007, Community Housing and Infrastructure Needs Survey 2006.

There is also an opportunity to support outer regional, remote and very remote areas by linking with inner regional areas. For the purposes of this report, inner regional areas are considered primarily for their potential to be developed as hubs for aggregation and processing of waste from remote and regional areas. There are already examples of this occurring, such as Plastic Forests, Newtecpoly, Replas and RPM Pipes, four successful manufacturers of recycled plastic products in the inner regional cities of Albury (NSW), Moama (NSW), Ballarat (VIC) and Kyabram (VIC), respectively.

Table 2 below shows the number of Australians residing within three community types in each state and territory. This data shows that regional and remote waste management is an issue of national significance: there are outer regional and remote communities in all jurisdictions except the ACT, and very remote communities in all jurisdictions except the ACT and Victoria.

Table 2 - Populations in community types (from 2016 census).[6]

State/Territory	Outer Regional	Remote	Very remote	Sub-total	National population
New South Wales	434,034	29,298	5,664	468,996	
Victoria	243,825	3,059	0	246,884	
Queensland	667,628	71,327	52,723	791,678	
South Australia	174,404	43,300	13,278	230,982	
Tasmania	154,807	7,681	2,487	164,975	
Western Australia	183,178	83,602	63,357	330,137	
Northern Territory	136,828	44,625	44,819	226,272	
Australian Capital Territory	0	0	0	0	
Other territories (1)	0	0	4,133	4,133	
Total	1,994,704	282,892	186,461	2,464,057	23,401,829
%	8.5%	1.2%	0.8%	10.5%	100.0%

(1) 'Other territories' is mainly offshore islands that are categorised within the very remote community type.

[6] Australian Bureau of Statistics, 2016. 2916.0 - Census of Population and Housing - QuickStats, Community Profiles and DataPacks User Guide, Australia, 2016. Available at https://www.abs.gov.au/ausstats/abs@.nsf/Lookup/2916.0main+features102016

ISLAND COMMUNITIES

While most of the population lives on the mainland or in Tasmania, there are a number of communities on some of Australia's many islands. These communities typically have small populations and transport to the mainland is by sea and in some cases by air. Communities on islands typically experience the same challenges in dealing with packaging and plastic waste as remote and regional communities on the mainland, including high transportation costs, small waste volumes that cannot be managed economically and lack of access to waste management expertise and infrastructure.

The exact nature of the challenges and possible solutions to waste management on islands will depend to a degree on the location and demographics of the islands. Some populated islands lie close to the mainland, while others lie more than 5km from the mainland. Some, generally those in northern seas, are largely occupied by Indigenous people, while others have become tourist destinations.

More than 5 km from the mainland

The islands that are more than 5km from the mainland have widely ranging characteristics based upon extent of Indigenous population, tourist visitations and governance models. For this reason, they are considered in the following classes:

- Primarily Indigenous community
- Primarily non-Indigenous community, mostly residents
- Primarily non-Indigenous community, with many visitors

Primarily Indigenous

Islands with Primarily Indigenous communities that are greater than 5km from the mainland typically have very remote communities. These islands, largely occupied by Indigenous people, are mostly located in the northern parts of Australia off the coast of Queensland and the Northern Territory.

A map showing the location of these islands is provided at **Figure 3** on the next page.

Water, sewer, power, waste services and food supply are essential services. These islands are characterised by a very low council rates base and reliance on grants and state and Commonwealth government funding to support community infrastructure. The islands also experience high freight costs which are in some cases impacted by monopoly operators.

The most populated set of islands is the **Torres Strait Islands** located between the tip of Cape York and Papua New Guinea. Of the hundred-plus islands in the group, 17 have established communities on them. A sizeable proportion (37%) of the population were counted on **Thursday Island**, the commercial centre of the region. Most (84%) of the resident population on the islands were Indigenous people, generally of Torres Strait Islander origin.

The main councils servicing the **Torres Strait Islands** are the Torres Strait Island Regional Council (TSIRC) which covers an area of 42,000 km2 and the Shire of Torres covering an area of 1,900 km2. **Warraber Island**, one of the 15 island communities serviced by the TSIRC, is included in this report as a case study (Appendix A). Horn Island, one of the 18 island communities serviced by the Torres Shire, is included in this report within the Plastics General – FNQ pilot case study 12.

Mornington Island, to the south-west of the **Torres Strait Islands**, is located among the **Wellesley Islands** (a group of 22 islands, in the south-east corner of the Gulf of Carpentaria). The **Mornington Island** community lives together in a settlement, called Gununa.

Gulf of Carpentaria, 40km from the Northern Territory coast. There are two main Aboriginal communities on the island, Angurugu and Umbakumba, which accommodate 59% of the residents who are Indigenous. Most non-Indigenous people live in Alyangula, a town built to service the magnesium mine that accommodates up to 1,200 employees, contractors and sub-contractors, as well as government workers and other service providers and their families.

Bathurst and **Melville Islands** to the north of Darwin, and some small surrounding islands, form the homelands of the Tiwi people. Many of these people live in the town of Nguiu.

Palm Island, some 25km off the Queensland coast, was mostly settled in the early 1900s when Indigenous people were moved there from the mainland. Nearly all of the residents are Indigenous.

Recycling services on these islands are generally a low priority when financial support is being sought and considered. All have landfill capacity issues except **Palm Island** and **Thursday Island** which have transfer stations with waste transferred to the mainland or another island for disposal.

Figure 3 - Map showing the location of islands with primarily indigenous communities

Primarily non-Indigenous, mostly usual residents

Islands with Primarily non-Indigenous communities, mostly usual residents that are greater than 5km from the mainland are remote communities. They have similar characteristics to islands with Primarily Indigenous communities except with a small council rate base which is inadequate to support the needs and essential services of any isolated community.

A map showing the location of these islands is provided at **Figure 4** below.

Kangaroo Island is Australia's third largest island, in area, after Tasmania and Melville Island. It is 13km off the South Australian coast and connected by car and passenger ferry. Over 150,000 visitors journey each year to the island. As well as its tourist industry, the island has established agriculture and fishing industries. This island could also be considered in the 'Primarily non-Indigenous communities, with many visitors' category. Kangaroo Island is included in this report as case study 7.

King Island lies in Bass Strait, almost equidistant from Victoria and Tasmania. King Island is best known for its beef production, seafood and dairy products. Besides these food producing industries, it is increasing attracting tourists given the development of two world class ranked golf courses and a unique kelp industry. King Island is included in this report as case study 8.

Christmas Island is closer to Singapore and Indonesia, being 360km south of Jakarta, than it is to the West Australian coast (1,540km offshore). The main industries are phosphate mining and tourism.

The Cocos (Keeling) Islands are located some 2,110km off the West Australian coast and 900km west of Christmas Island. Only Home Island and West Island of the 27 small islands in the group are populated.

Flinders Island is in Bass Strait, 53km north-east of Tasmania, and is by far the most populated of the 52 islands in the Furneaux Group. Between 10% and 20% of the population are Indigenous people.

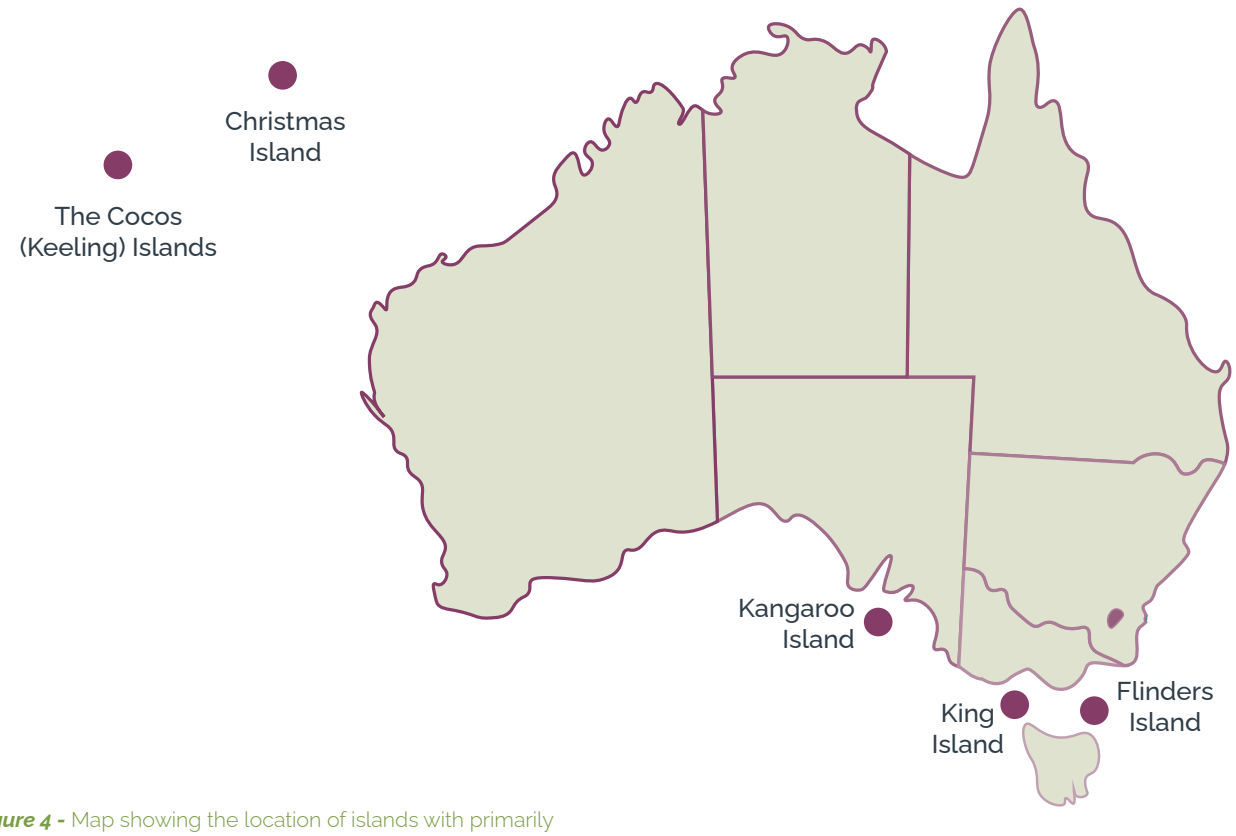


Figure 4 - Map showing the location of islands with primarily non-indigenous communities, mainly consisting of usual residents

Primarily non-Indigenous with many visitors

Islands with Primarily non-Indigenous communities, with many visitors that are greater than 5km from the mainland are remote communities. They have similar characteristics, to Primarily Indigenous communities except that these islands generally have the financial resources, from revenue associated with tourism that is potentially available to support recurrent investment in services.

A map showing the location of these islands is provided at **Figure 5** below.

Lord Howe Island is a small island located 570km east of the mid-north coast of New South Wales and gained world heritage status in 1984 for its unique flora and fauna. Tourism is the basis for the island economy with over 15,000 visitors per year. Lord Howe Island is included in this report as case study 9.

The **Whitsundays** are a group of over 70 islands clustered on Queensland's Great Barrier Reef, mostly between 10km and 20km offshore. Many are national parks and others, for example Hamilton, Hayman, Daydream and Lindeman Islands, have large tourism operations and resorts with high staff numbers to support visitor services. Hamilton Island is included in this report as a case study 6.

Moreton Island is a sand island in Moreton Bay, 15km off the Queensland coast east of Brisbane.

Norfolk Island, 1,600km north-east of Sydney, is founded on tourism with about 25,000 visitors per year. Since 2016 it has been governed by the Norfolk Island Regional Council.

Rottnest Island, 18 km from Perth, is a popular destination catering to over 500,000 day trippers and overnight-stay visitors each year.

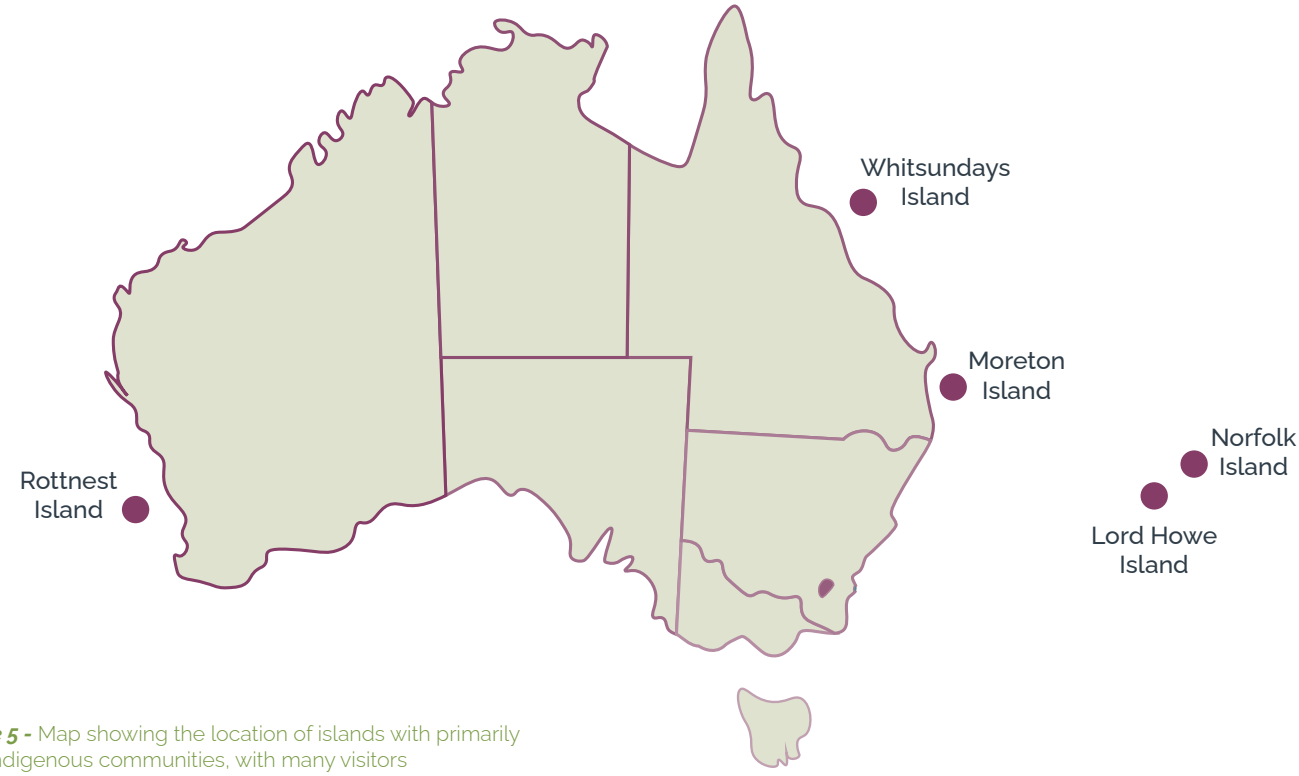


Figure 5 - Map showing the location of islands with primarily non-indigenous communities, with many visitors

Less than 5km from the mainland

Islands that are less than 5 km from the mainland are classified as outer regional. Typically, they have a local government structure and access to a regular transport service to the mainland which in some cases is road transport. Examples include Bribie Island and Philip Island.

COMMUNITY RECYCLING CHARACTERISTICS

The cost of waste collection for remote and outer regional areas is higher due to the poorer economies of scale with lower populations and the significant transport distance.

Collected recyclables are usually transported to inner regional Material Recovery Facilities (MRFs) in an uncompacted or semi-compacted form. After sorting, there is often a significant travel distance to the final reprocessing or export destination. Operational costs for recycling are higher than in inner regional areas and major cities due to the significant travel distances to sorting facilities, reprocessing facilities and export destinations as well as low population densities. For example, according to Sustainability Victoria data, the kerbside recycling costs for Victorian rural township households in 2017/18 was over twice the cost for metropolitan households.

Islands also face an increased cost in transport due to their reliance on sea-based freighting. Many of the islands also have storage space constraints. Often the connection between the island and the mainland community is less tangible than for other remote areas.

Table 3 below presents a summary of the status of collection, transportation, recycling and end markets in outer regional, remote and very remote areas. This draws on information overview presented below on the of services in these areas, and on information presented in the case studies in **Appendix A**.

Table 3 - Summary of the status of collection, transportation, recycling in outer regional, remote and very remote areas.

		Outer regional	Remote	Very remote
Packaging waste collection	Drop-off facilities	Some general recycling and product stewardship schemes.	Some general recycling and product stewardship schemes	Sometimes available
	Kerbside collection	Inconsistently provided	Provided in some locations	Very rarely provided
Transportation		Significant cost barrier	Significant cost barrier and other challenges in some areas	Rare examples only
Recycling		Glass crushing; some plastics reprocessing (e.g. Integrated Recycling, Mildura, Vic)	Some glass crushing (e.g. Alice Springs, NT)	Very little
End markets		Glass, plastic products e.g. fence posts	Glass	Very little

OUTER REGIONAL

Drop-off facilities

Where households and businesses are not provided with a kerbside service for waste and recyclables, they will often have the opportunity and responsibility to self-haul material to local landfills, transfer stations or drop-off sites. Both the kerbside collections and drop-off arrangements are generally provided by local government to its ratepayers. Despite the challenges of distance, many outer regional communities achieve commendable recycling outcomes.

Kerbside

Commingled kerbside recycling services are typically provided by local government in town centres and along kerbside collection transport routes in regional areas. Despite this, the coverage is inconsistent.

In rural or semi-rural areas, residents are sometimes required to bring recycling to the roadway or to a township drop-off point or strategically placed transfer station.

In some regional areas, collections are on a less frequent basis than for inner regional areas and major cities. The commingled recyclable material collected is transported and sorted at a MRF or freighted to an inner regional population centre for reprocessing. The extent of kerbside servicing is not published at a national level.

In several states, including Queensland, Victoria and Tasmania, kerbside coverage is high. Within these states kerbside recyclables collected are transported to MRFs, mostly in inner regional areas, for sorting. For Tasmania, the markets for most recovered packaging materials are on the Australian mainland requiring sea freight.

Detailed assessment of kerbside services is not within the scope of this report.

Reprocessing

Primary processing facilities, particularly baling and glass crushing, occur in many outer regional areas. However, more advanced reprocessing facilities in the outer regional areas are limited to a few plastics facilities that accept post-consumer rigid plastic packaging. The plastics are usually shredded, flaked, and washed before being used in pipe or transport and furniture applications. Some of the flaked material is sent into national and international markets for extrusion and reuse. There are no facilities for the advanced recycling of glass, paper or metals in outer regional areas. Some fibre based packaging will be included in composting ventures in small quantities.

REMOTE

Drop-off facilities

Residents and businesses are sometimes required to bring recyclables to a township drop-off point. The distance to drop-off can be quite significant due to lower population densities.

Commercial sourced packaging

There are inconsistent recovery efforts for commercial sourced packaging in remote areas. For some larger retailers, these can be part of national recycling and waste service contracts. Often these are handled by local contractors on behalf of the national contracted company.

Kerbside

In only a few remote areas, a kerbside service is provided by local government in town centres and along key transport routes. It is typically a combination of garbage and commingled recycling bins, often collected on a less frequent basis than for urban centres. The recycling material collected is usually transported and sorted and processed at a MRF located in inner regional areas.

There are no MRFs in remote areas.

Container deposit schemes

Where Container Deposit Schemes (CDS) are operating, these materials are often returned through deposit redeeming pathways rather than council collection services. As a result, the community recycling effort is often limited to materials that carry a deposit.

VERY REMOTE

Drop-off facilities

A key feature of many very remote communities is the self-management of waste and recyclables with community collection. There is little separation for recycling, except where a commodity has an inbuilt value such as used lead acid batteries, cardboard, and beverage containers captured in CDS programs.

Where recyclables are collected, they are mostly taken to drop-off facilities located at landfills that are state government funded.

Commercial sourced packaging

There is limited commercial activity. A small amount of cardboard is baled for transportation using reverse logistics (see case study 2).

Reprocessing

There is almost no sorting or reprocessing capacity in very remote areas.

Container deposit schemes

Householder collections and drop-off of recyclable materials are generally limited to materials for which the deposit may be redeemed.

Kerbside

Kerbside collections are generally not provided to very remote communities due to the high cost associated with low population densities, large travel distances to MRFs and infrastructure challenges.

In very remote areas, with very little or no council rate base, funding for recycling is through government programs and product stewardship schemes.

Many programs start promisingly with capital expenditure but suffer from a lack of funding for operations and maintenance.

ISLAND COMMUNITIES (>5 KM FROM MAINLAND)

Primarily Indigenous

Recycling services on these islands are generally a low priority when financial support is being sought. These islands have landfill capacity issues except Palm Island and Thursday Island which have transfer stations with waste transferred to the mainland or another island for disposal.

Horn Island, one of the 18 island communities serviced by the Torres Shire, is referenced in this report within the Plastics General – FNQ pilot, case study 12.

These island communities are reliant on grants and government financial support to support community recycling.

Primarily non-Indigenous, mostly usual residents

Kangaroo Island and King Island are within this island community. Both have some existing or possible packaging material recovery. Relevant lessons learnt from these islands are presented in case studies 7 and 8.

Primarily non-Indigenous with many visitors

Lord Howe Island and Hamilton Island are Primarily non-Indigenous communities, with many visitors islands with packaging material recovery programs. Relevant lessons learnt from these programs are presented in case studies 9 and 6.

POTENTIAL MATERIAL FLOWS

Detailed material flows for packaging and plastic are not available for specific remote and regional areas. To develop an estimate of potential packaging waste available for recycling, a national average of material flows per person was used. **Table 4** below shows the anticipated annual weight of different packaging materials that might be recovered from remote and outer regional communities based on a national average of 90-100 kg per person.

Table 4 - Potential annual recycling yields for remote and outer regional communities (tonne/yr).[7]

Paper & cardboard	Glass	HDPE	PET	Other plastics	Steel	Aluminium	Total
122,000	68,700	11,100	6,700	4,400	4,500	4,400	221,800

The split of these potential annual recycling yields across communities is 179,500 tonnes from outer regional areas, 25,500 tonnes for remote areas, and 16,800 tonnes for very remote areas.

The split per state for these potential annual recycling yields are given in **Table 5** below. This data shows that the state with the largest potential recycling yield from remote and outer regional areas is Queensland, with 32% of the national total for these areas.

Table 5 - Percentage of total potential annual recycling yields from remote and outer regional areas occurring in each state and territory.[8]

NSW	VIC	QLD	SA	TAS	WA	NT	Total
19%	10%	32%	9%	7%	13%	9%	100%

The data presented in Tables 4 and 5 does not include other plastics. Sources of plastic waste in remote and regional areas include agricultural plastics such as pipes, bulk bags and crop protection films. These tend to be relatively homogeneous materials and may be present in significant quantities locally or regionally.

[7] These estimates were developed by Sustainable Resource Use Pty Ltd based on analysis of data included in APCO, 2019. Packaging consumption and recycling data 2017-18 baseline data, and APCO, 2020. Our Packaging Future.

[8] These estimates are derived from the estimated potential recycling yields provided in Table 4 and the distribution of population provided in Table 2 above, assuming equal average packaging waste flows per person across different areas of Australia.

Current approaches, gaps and opportunities

This section of the report provides a brief overview of the existing programs, approaches and technologies currently used in or potentially suitable for remote and regional areas of Australia, in relation to:

Capability development, planning and governance.

Packaging waste collection

Transportation

Recycling

End markets

These lists are not intended to be exhaustive, rather it is intended to provide an overall picture of the situation in remote and regional areas. Some of the programs, approaches and technologies are described in more detail in the case studies presented in **Appendix A**.

In each category, an analysis of gaps and challenges in existing approaches is provided and opportunities to take action to deliver better outcomes are identified. The opportunities listed here are intended to advance discussion by all stakeholders on work to improve outcomes through the Collective Impact Framework for achievement of the 2025 Targets.

CAPABILITY DEVELOPMENT, PLANNING AND GOVERNANCE

Table 6 below lists programs and approaches to capability development, planning and governance for waste management and recycling in remote and regional areas.

Table 6 - Programs and approaches to capability development, planning and governance

Program/approach	Where?	Description
NSW Aboriginal Communities Waste Management Program (see case study 22)	There are 61 eligible Aboriginal communities across NSW.	Stage 2 of the program includes funding to establish a paid community engagement advisor, and a project manager to develop and deliver the project. Stage 3 of the program includes funding for educational materials and activities and employment of a community engagement advisor and project manager.
Western Australian waste management plans	Councils in the Perth and Peel regions and the major regional centres of Albany, Busselton, Bunbury, Greater Geraldton and Kalgoorlie-Boulder, and Bunbury-Harvey.	Under WA legislation, the relevant councils are required to prepare a waste plan outlining how waste services will be managed to achieve consistency with the Waste Strategy and protect public health and the environment. Councils are required to report on the implementation of their waste plan annually.
Victorian Waste and Resource Recovery Groups (WRRG)	There are 6 regional WRRGs, in addition to the Metropolitan WRRG.	The WRRGs are Victorian government statutory authorities responsible for: • Regional waste and resource recovery infrastructure planning. • Integrating regional and local knowledge into state waste and resource recovery strategies. • Public and business education. • Ensuring regional plans and programs are informed by local government, business and communities.
Regional Networks for Effective Waste Management (RENEW) NSW	A network of voluntary regional waste management groups (VRWGs), including 8 in regional and rural NSW as well as 6 in the Greater Sydney area.	RENEW NSW is supported by NSW Government funding. Participating VRWGs develop and implement strategies to improve waste management and resource recovery in their regions, and collaborate across regions on waste management and resource recovery projects to: • Improve service delivery. • Develop consistent research methods. • Share skills and resources. • Negotiate cost-effective contracts.
Central Australia Waste Management Working Group (CAWMWG)	A joint initiative of the MacDonnell (see case study 10), Barkly and Central Desert Regional Councils, supported by the NT Government and Local Government Association NT.	CAWMWG services 33 remote communities with populations ranging from approximately 100 to 800 people. Aims include maximising resource recovery and community litter education, which are not part of Councils' waste budgets. CAWMWG delivers: • Upgraded procedures. • Ongoing training for staff. • Upgraded facilities. • Recycling facilities and opportunities.

Program/approach	Where?	Description
Queensland Resource Recovery Industries 10-Year Roadmap and Action Plan, and Queensland Indigenous Waste Strategy.	Queensland, including outer regional and remote areas of the state.	The Queensland Government's Resource Recovery Industries 10-Year Roadmap and Action Plan supports investment for reducing waste going to landfill. The $100 million Resource Recovery Industry Development Program supports growth of resource recovery and recycling. The Queensland Indigenous Waste Strategy was developed by Aboriginal and Torres Strait Islander councils, the Queensland Government and LGAQ, to guide waste management and recycling activities across communities.
Formal education and training	All jurisdictions.	The Australian Qualification Framework includes CPP30719 Certificate III in Waste Management. Organisations such as National Waste and Recycling Industry Queensland provide training and are increasingly attuned to the potential role of product stewardship. KABCNT and other stakeholders are exploring the possibility of a establishing a certificate course in waste management for Rangers and Council Staff at Batchelor Institute in the Northern Territory. The University of Technology Sydney's Institute for Sustainable Futures is partnering with industry and the Commonwealth Government to establish a Product Stewardship Centre of Excellence.
KAB programs	National programs e.g. Tidy Towns, and state organisations e.g. KABCNT and KESAB.	The Tidy Towns program is a significant focus for regional and remote communities (e.g. see case study 10). KABCNT and KESAB are funded by the NT and SA governments respectively to deliver awareness raising and capability development activities in remote and regional areas. The informal networks established by these organisations also support knowledge transfer between council areas.

Gaps and challenges

Gaps and challenges in capability development, planning and governance approaches include:

- Outside of the larger regional centres, it is unlikely to be feasible to develop and retain local capability to operate and maintain complex plant and equipment.
- Loss of capability through departure of key personnel such as council employees can result in the cessation of programs and activities.
- It is very difficult for city-based potential partners such as state government employees and administrators of product stewardship schemes to visit remote communities, with the result that formal and informal networks are not well developed, hindering collaboration.
- Participants highlighted challenges in adapting common approaches to governance, policy development and program delivery to remote and very remote communities, including:
  - Uncertainty about the balance of responsibility and authority between the three tiers of government and communities for waste policy, operations and funding.
  - The need to allow sufficient time for programs to begin to deliver outcomes, which may take longer than government funding cycles.
  - The need to listen and connect with communities, work through existing structures and respect communities' ownership of outcomes.
  - The significant diversity of communities within and between regions.

Opportunities

Opportunity 1

Work with regional governance groups to identify and build on successful local and regional approaches. Local Government Associations and groups such as Victoria's WRRGs, RENEW NSW, the Northern Territory's CAWMWG and Queensland's Regional Organisations of Councils provide a valuable link to local councils and communities. Engagement with these groups could be an efficient and effective way for product stewardship organisations to identify opportunities to better service regional and remote communities.

Opportunity 2

Embed staff in regions to coordinate delivery of product stewardship services. Staff could be embedded in regional governance organisations, local governments or community groups such as KABCNT and KESAB. They would be responsible for coordinating engagement between external partners such as product stewardship organisations, and local governments and communities. They would assist in identifying collection, transportation, processing and end market opportunities, promote product stewardship within communities and facilitate collaboration between product stewardship schemes.

Opportunity 3

Support the uptake and enhancement of training opportunities in waste management and product stewardship for local government, industry and community employees.

Opportunity 4

Consider lessons learned from the NSW Aboriginal Communities Waste Management Program as a model for developing waste management capability within communities.

Opportunity 5

Establish a national working group to drive product stewardship outcomes in remote and regional areas. The working group would include representation from and support collaborative between jurisdictions, tiers of government, product stewardship organisations, industry and community organisations. The focus would be on supporting implementation of actions 3.14 and 3.15 of the *National Waste Policy Action Plan*.

PACKAGING WASTE COLLECTION

Product stewardship schemes

Table 7 below lists product stewardship schemes that collect specific packaging types in outer regional, remote and, less frequently, very remote areas. These schemes are generally industry-funded, while some also require a commitment on the part of collection partners to buying back products made from recycled materials.

There are a number of other product stewardship programs that collect products other than packaging, which could potentially be involved in a partnership approach to sharing collection infrastructure and processes, including Mobile Muster (mobile phones), Soft Landing (mattresses) and the National Television and Computer Recycling Scheme (e-waste).

Table 7 - Product stewardship schemes collecting packaging waste in remote and regional areas

Program	Scope	Supply chain integration	Coverage
drumMUSTER (see case study 5)	Metal or plastic agricultural chemical containers.	Collected containers are transported and recycled.	National including very remote areas.
REDcycle (see case study 17)	Flexible plastic packaging.	Collected waste is transported for recycling and remanufacturing. Participation requires commitment to buy back remanufactured products.	National – collection through retailers.
Plastic Police (see case study 16)	Flexible plastic packaging.	Community engagement and behavior change activities are included. Collected waste is transported for recycling and remanufacturing. Participation requires commitment to buy back remanufactured products.	Currently in inner regional NSW.
QLS E-Cycle Solutions	Expanded polystyrene packaging from electrical products.	Collected waste is transportation via reverse logistics and recycled by QLS.	National – collection through electrical retailers including in some remote areas.
PaintBack	Paint containers collected with waste paint.	Collected waste is transported for recycling.	National including some remote sites.
Farm Waste Recovery	Plastic grain and fertilizer bags.	Collected waste is transported and recycled.	National.
Container deposit schemes (CDS)	Beverage containers.	Collected containers are transported and recycled.	All jurisdictions have CDS except Victoria and Tasmania, which have committed to establishing schemes.

Other collection programs and approaches

Table 8 below lists a range of collection programs and approaches in outer regional, remote and, less frequently, very remote areas. These schemes are generally industry-funded, while some also require a commitment on the part of collection partners to buy back products made from recycled materials.

Table 8 - Approaches to collecting packaging waste in remote and regional areas

Program/approach	Example	Description
Co-mingled kerbside recycling	Alice Springs (see case study 1); Broome (see case study 4); Kangaroo Island (see case study 7).	Regular kerbside collection in larger communities, servicing a local MRF.
Kerbside, bag-based recycling	Bourke Shire Council (see case study 3).	A local Aboriginal community enterprise operated a collection program for bagged recyclables from 2010 to 2013. Cardboard and cans were baled for transportation and glass was crushed and used locally.
Drop-off site for source-separated recycling	MacDonnell Regional Council, Northern Territory (see case study 10).	A range of communities have developed a model for recycling drop-off and sorting sites. MacDonnell Regional Council in the Northern Territory has developed recycling enclosures at some communities, with source separation of waste into different recycling streams which are then transported to Alice Springs for recycling or onward transportation.
Cardboard collection	APY Lands, South Australia (see case study 2).	Collection of cardboard for baling and transportation using reverse logistics.
Collection and return of reusable packaging	Hamilton Island (see case study 6).	Coles and Woolworths have implemented an approach to deliver groceries on Hamilton Island in reusable boxes, which are collected and returned by a contractor.
NSW Aboriginal Communities Waste Management Program (see case study 22)	29 of the 61 eligible communities have received funding in the first two rounds of the program.	Stage 3 of the program includes potential funding for infrastructure and arrangements to collect recyclables.

Gaps and challenges

Gaps and challenges in collection programs and approaches include:

- Inconsistent coverage of product stewardship schemes and other programs approaches between communities. For example, where a state or territory CDS is in place, many remote communities lack CDS collections, while industry-led programs often do not extend into many remote and very remote areas. Establishing and maintaining collection services in outer regional and remote areas is difficult and costly for product stewardship administrators, due to lack of local knowledge and contacts and low waste volumes.
- Not all packaging is covered by existing collection programs. For example, CDS is limited to beverage packaging excluding wine bottles and does not include other steel, plastic and glass containers.
- Small waste volumes and consequently high costs per tonne collected, combined with lack of options for transportation and recycling, make establishment of a collection program a complex undertaking.
- Reliance on external funding to maintain collection programs.
- Flexible plastics collection services are not available in areas where there are no Coles or Woolworths stores.
- Lack of collection options for commercial packaging waste.

Opportunities

Opportunity 6

Consider lessons learned from existing models for packaging waste collection and adapt or apply successful approaches in other communities. Adapt and apply with the aim of establishing basic collection of recyclables from households and businesses across all areas nationally. Potential collection models include the kerbside bag collection model used by Bourke Shire Council from 2010-2013 (case study 3) and the drop-off approach developed by MacDonnell Regional Council in some communities (see case study 10).

Opportunity 7

Engage brand owners to consider providing collection facilities in remote communities. The success of the REDcycle program collecting through supermarkets (case study 17) and QLS E-Cycle Solutions collecting through electrical retailers demonstrates the potential of retailer-based collections for packaging materials. There are, however, very few retail outlets in remote communities that provide collection facilities for packaging waste.

Opportunity 8

Foster collaboration between product stewardship schemes to establish and maintain shared collection services.

Opportunity 9

Broaden existing collection systems to include other compatible materials. For example, CDS could be broadened to cover other beverage packaging, and potentially other product packaging would increase the benefit including recovery of non-deposit carrying packaging.

Opportunity 10

Trial alternative packaging materials and formats for remote areas to reduce the amount of waste produced. For example:

- Reusable packaging: the reuse of grocery delivery boxes on Hamilton Island (see case study 6) highlights the potential of reuse models to reduce packaging waste.
- Where small-scale composting systems could be more efficiently established in communities, compostable food packaging could potentially reduce plastic waste.

TRANSPORTATION

Table 9 below lists examples of programs and approaches to transporting waste.

Table 9 - Approaches to transporting packaging waste in remote and regional areas

Program/approach	Description
South Australian Regional Transport Relief Fund program (see Case Study 19)	This program provides a $12 per tonne subsidy per 100km for kerbside-sourced material sent from consolidation facilities to capital city recycling destinations. The program is likely to be extended and has already resulted in positive packaging material recycling outcomes.
Queensland Regional Recycling Transport Assistance Package (RRTAP)	RRTAP is providing $6 million in grant funding to help fund the cost of transporting recyclable material from regional Queensland to recovery and processing facilities. The program seeks to: • Provide interim support for regional Queensland to divert more resources from landfill and recycle additional material. • Facilitate recycling which is currently unviable due to transport costs. • Reduce the environmental and social impacts of waste on regional communities.
Reverse logistics	Backloading of retail supply vehicles with recyclable materials occurs within only a few very remote communities and the backloaded material is mainly cardboard (e.g. see case study 2). QLS E-Cycle solutions uses reverse logistics to transport expanded polystyrene collected from electrical retailers nationally. RPM Pipes receives waste polyethylene from outer regional areas in several states via backloading on loads of pipes (see case study 18).
Regional hubs	In some cases waste is transported from communities to a regional centre for aggregation and onward transport. For example see case study 10.

Gaps and challenges

Gaps and challenges in transportation approaches include:

- High cost per tonne of waste transported due to small waste volumes, long transport distances and scarcity of transport options.
- Unsealed roads in some areas increase the cost of transportation due to additional wear and tear on vehicles.
- Seasonal road closures e.g. due to flooding.
- Regional hubs are not available in many areas and may require facilities for loading/unloading and storage of waste.
- Although there are some examples of effective backloading, there remain significant barriers to the widespread use of reverse logistics, including incompatibility of waste materials, incompatible routes and scheduling, information management and cost.
- Reliance on external funding to pay for transportation due to lack of resources with communities and local governments.
- Private sector agents handling the transporting as well as collection and consolidation of recyclable materials do not always collaborate with local communities and between agents handling different waste streams, meaning that opportunities are not realised to scale up facilities and reduce unit operating costs.

Opportunities

Opportunity 11

Establish regional hubs for aggregation of waste for more efficient transport, informed by a region-by-region analysis of material flows and availability of processing and market opportunities. On-site storage of some materials may need to be under cover. These hubs could be an expansion of council run depots or private agents' consolidation facilities.

Opportunity 12

Consider the potential for waste transport subsidies to enable the development of regional recycling capabilities. The success of the South Australian Transport Relief Fund program (case study 19) demonstrates the significance of cost as a barrier to transportation and the potential to overcome it through subsidies. A similar program could be considered for wider implementation.

Opportunity 13

Facilitate the consolidation of different waste streams within regions for more efficient transportation and processing, through a collaborative approach between contractors or more effective contracting.

Opportunity 14

Conduct an analysis of barriers and opportunities for shared transportation including reverse logistics. Consideration could be given to a project to map transport routes and opportunities and analyse the barriers and opportunities for shared transportation, including reverse logistics, and conducting a pilot project within a region.

RECYCLING

First stage processing and mechanical recycling

Table 10 on the following page lists a range of first stage processing and mechanical recycling technologies currently used in remote and regional areas.

First stage processing involves crushing or compaction with baling. As remote and regional areas usually do not generate sufficient recyclable material to justify local reprocessing, it is necessary to either use the materials locally (e.g. crushed glass used in road construction or concrete) or to transport consolidated materials to MRFs, reprocessing facilities or export destinations in inner regional areas or major cities. Consolidation of recyclable materials prior to transport reduces the density and transport cost hence increases the viability of its recovery and allows for longer haul to end markets. Recycling materials that can be compacted and baled include cardboard and other fibre packaging, tinplate steel and aluminium.

Separated glass from CDS, kerbside collections, drop-off facilities and regional hubs can be crushed for transporting. Transporting of crushed and separated glass to beneficiation plants can be viable where the separated glass has a higher value after transport when reprocessed into glass packaging (where the distances to beneficiation plants is not significant).

Table 10 - Mechanical recycling technologies for packaging waste in remote and regional areas

Technology	Example	Description
Cardboard baling	APY Lands, SA (see case study 2).	Baling of cardboard is not widespread in remote and outer regional areas. However, combined with backloading to market, baling has been a profitable local enterprise in the APY Lands, SA since 2009.
Glass crushing – fixed and mobile crushers	Alice Springs (see case study 1); NetWaste Regional Waste Management Group (see case study 21) ; Cairns; Rockhampton.	Glass crushers have been installed at several regional and remote locations. A mobile glass crusher was installed at the Wellington Resource Recovery and Transfer Station in NSW in 2012. It was to be used by five councils in the NetWaste Regional Waste Management Group. However, operation of the crusher was dependent on a government wage subsidy scheme. Following a change in government policy and cessation of the subsidy, the councils considered that the costs could not be passed onto the community and the recycling service was terminated.
Small scale plastics recycling	Shruder (see case study 14); 3D printing of plastic items (see case study 13).	The Shruder is a portable, integrated shredder and extruder that converts small volumes of waste plastic into saleable raw materials or new products. It can shred 20kg of plastic/hour (1 tonne per month). A project was established in the Northern Territory in 2015 to provide 3D printers as a way of encouraging educational outcomes in very remote communities. Feedstock was derived from shredding and extruding plastic from beverage containers.
Mixed polymer plastics recycling	Plastic Forests (Albury, NSW); Newtecpoly (Moama, NSW); Integrated Recycling (Mildura, VIC); Envorinex (Bell Bay, TAS, see case study 15).	A number of plastics recyclers located in regional areas are mechanically recycling plastics that are a mix of different polymers. While this mixing restricts many applications, it can produce a material that can be formed into different profiles and used in a broad range of products.

Technology	Example	Description
Single polymer plastics recycling	Pact Group have recently announced a PET plant in Albury-Wodonga; RPM, Kyabram, VIC (see case study 18).	There are facilities being developed in regional areas that are of a sufficient scale to process many thousands of tonnes of plastics, e.g. the PET plant recently announced by PACT Group in Albury-Wodonga will have a capacity of 10,000 tonnes. RPM is a plastic pipe manufacturer based in Kyabram, Victoria. It recovers and recycles HDPE into large diameter pipe for civil and agricultural use.
Organics recycling	Biobin on Warraber Island, Queensland (see case study 20).	Small scale, simple technology composting systems have been installed in some remote communities, often associated with small scale food production. There are a number of proprietary composting systems on the market that could be suitable. One example is Biobin, developed by Peats Soil Pty Ltd in South Australia. Biobin modular systems are available in a range of sizes. They can be provided either as serviced units, while self-maintainable units are available for remote areas.

Gaps and challenges

Gaps and challenges in first stage processing and mechanical recycling include:

- Lack of capital and operational funding.
- Lack of local capability to operate and maintain plant and equipment.
- Low uptake of simple technologies such as baling and crushing due to start-up costs, lack of knowledge of opportunities, and other barriers.
- The approach to glass recycling across remote and regional areas is inconsistent and at present it is most commonly either landfilled or stockpiled.
- While glass crushing is available at some regional facilities, in some cases the crusher has not operated for significant periods of time due to a range of reasons including a lack of maintenance and inadequate capacity.
- There are few regional plastics processing facilities across the nation, and those that have been established are highly dependent on growing markets for recycled content.
- While small scale plastic reprocessing technologies have developed rapidly, the degree to which these will support viable local businesses is not clear.

Opportunities

Opportunity 15

Undertake further analysis of the economic and technical feasibility of local and regional recycling options based on community size and material flows, and the co-benefits of establishing local and regional recycling capability. For example, low volume, modular reprocessing solutions such as extrusion systems combined with 3-D printing may be suitable for some remote communities.

Opportunity 16

Consider the widespread installation of first stage processing equipment to increase transport efficiency and storage capacity.

- Small scale first stage processing equipment can be installed at points of sale, drop off facilities and regional hubs within remote and regional areas. In addition to increasing transport efficiency, first stage processing also increases storage capacity.
- Baling of cardboard can be sustained as a profitable local enterprise when combined with reverse logistics.
- Glass crushing can eliminate the need for transport when combined with local reuse.

Opportunity 17

Consider the establishment of mechanical recycling facilities in regions with sufficient material flows and potential end markets. This will enable freight costs to be reduced and realisation of local employment benefits. Opportunities for local mechanical recycling (reprocessing) within remote and regional area include glass and plastics.

Opportunity 18

Consider the establishment of enterprises to utilise regional material flows and service regional product markets. The success of several existing small to medium enterprises in inner and outer regional areas suggests there is potential for further businesses to be developed. These businesses could be located at regional hubs for aggregation, or where there are significant sources of waste such as agricultural plastics. Detailed regional material flow analyses and end market development will be required. The Far North Queensland project discussed in case study 12 is exploring options for plastic recycling in Far North Queensland, and the development of a framework for considering plastics recycling opportunities in other regions.

Opportunity 19

Consider the suitability of composting systems for cardboard, paper and food packaging where material recycling options are not available.

Chemical recycling

Table 11 below lists two potential chemical recycling technologies that are currently being progressed in Australia.

Table 11 - Potential chemical recycling technologies being progressed in Australia

Technology	Example	Description
Cat HTR technology	iQ Renew, NSW.	Chemical recycling company iQ Renew own the rights to the Cat-HTR chemical recycling technology for plastic waste in Australia and New Zealand. This technology aims to use chemical recycling to convert a mix of post-consumer plastics, including soft plastics and multi-layer packaging, into chemicals to make new plastics and fuels.
Oil production from waste	Northern Oil Refinery, Gladstone, QLD.	Northern Oil Refineries Pty Ltd has received funding under Round 8 of the Cooperative Research Centres-Projects program to implement the production of Australian Standard diesel from mixed waste including plastics.

Gaps, challenges and opportunities

Further analysis is needed on the potential for chemical recycling to play a possible role in processing packaging and plastic waste in remote and regional areas.

Growing markets for recycled materials in remote and regional areas

Table 12 below lists a range of end-market opportunities in remote and regional areas.

Many remote and regional councils and businesses have demonstrated an interest in and commitment to procurement of recycled materials, particularly for use in civil construction.

In some cases this involves the use of locally sourced materials such as crushed recycled glass in road construction and concrete. In other cases, collected materials, particularly plastics, are transported long distances for reprocessing, and recycled products and materials are then transported back into the regions.

Table 12 - End markets for packaging and plastics waste in remote and regional areas

Technology	Description
Pipe manufacture (see case study 18)	RPM Pipes produces large diameter pipes from flaked polyethylene and have built a market among local water authorities and the farming and civil construction industry. In 2019 RPM Pipes received approval from the Department of Transport (VicRoads) for their pipes to be used in large scale civil applications. Waste polyethylene packaging is received from outer regional areas in Victoria, NSW, QLD, SA, and Tasmania. The operation is reprocessing over 250 tonnes per year. By producing the pipe from flaked recycled material, full extrusion of the plastic is not required. This makes the process less costly and infrastructure intensive and therefore may offer a model for other regionally based plastics recycling.
Products made from recycled plastics	In a number of locations, mixed or single polymer plastics are being used to produce structural products for local, regional and national markets. Products include bollards, decking, sound walls, reflector posts, cable cover, outdoor furniture and landscaping products. Companies such as Plastic Forests, Newtecpoly, Envorinex, Replas and Integrated Recycling operate in regional Australia and combine mixed plastics recycling and manufacturing. Other manufacturers using recycled plastics include Westonfence in Parkes, NSW, which manufactures droppers for electric fences from recycled plastic collected through drumMUSTER (see case study 5). A key challenge is balancing tonnes collected for recycling with tonnes sold as product. Plastic Forests and Replas partner with RED Group as part of the REDcycle program, which requires participants to commit to buy back products made from recycled plastics.
Plastics into road construction	Recycled plastic is increasing in use as a bitumen replacement in road surfacing. For example Close the Loop flexible plastics sourced from the REDcycle program and printer cartridges to manufacture Toner Plas, which is used by Downer in road construction. Other major road builders such as Boral Different companies have developed their own blends. Two major projects are underway to characterise plastic waste streams suitable for road construction and develop standards for their use, including by the Australian Roads Research Board (ARRB) working with the Queensland and WA government roads agencies, and Austroads working with RMIT. The ARRB project is also looking at opportunities to increase use of plastics in associated infrastructure such as sound walls and geogrid. The Austroads project is also looking at the potential use of plastics as an aggregate.
Glass into road construction	A number of councils and contractors use recycled packaging glass in local road projects rather than haul it to major cities for beneficiation. This reduces the need for quarried aggregate. Austroads has engaged ARRB to investigate the use of glass in road construction, including potential uses, specifications and performance standards and economics.
Microfactories	The University of NSW Sustainable Materials Research and Technology (SMaRT) centre is pioneering a range of small scale reprocessing technologies. Because they can transform waste almost anywhere it is stockpiled, SMaRT green materials have the potential to create more local jobs. A microfactory is being trialled in Somerton, Victoria, for materials sourced from electronic waste (see case study 11).

Gaps and challenges

Gaps and challenges in the development of markets for recycled materials include:

- While there are some instances where using recycled materials helps to address local waste issues (e.g. locally sourced crushed glass, and participation in the REDcycle program), this is not always the case and it may be difficult to establish a business case to do so.
- Where local materials are utilised, e.g. crushed glass in road and other civil construction, it is not yet clear that this provides a cheaper solution to waste disposal than landfill in some areas.
- Lack of local awareness of opportunities to use recycled content, and information and standards on specifications and performance.
- Lack of regional availability of recycled materials products.
- While there are some successful businesses in regional areas servicing recycled content markets, the economics of establishing and sustaining these businesses in a wider range of areas are not yet clear.
- Establishing plants and equipment in regional areas to utilise local waste and service local markets requires operational and maintenance capability.
- Lack of availability of capital and operational funding in regional and remote areas.

Opportunities

Opportunity 20

Support the development of standards for the use of recycled crushed glass and recycled plastics in road and other civil construction. Research to inform development of standards is undertaken by the Australian Roads Research Board and other organisations.

Opportunity 21

Support trial projects utilising recycled crushed glass and recycled plastics in road and other civil construction.

Opportunity 22

Explore options to increase the participation of remote and regional communities in whole-of-life cycle programs such as Plastic Police and REDcycle, including through regional-scale implementation. Participation in these programs at a regional level may provide greater options to manage the commitment to procuring recycled content. For example, flexible plastic collection services could be provided to several communities in return for a commitment at a regional level to include plastics in road construction and other civil infrastructure.

Conclusion and next steps

As noted in the introduction to the report, APCO is committed to supporting benefit to remote and regional communities through a Collective Impact Framework that recognises the roles played by all three tiers of government, industry and community groups. This paper provides both a record of the preparatory work undertaken by APCO to date, and a starting point for the next phase of this important work.

APCO will continue to work with stakeholders to further develop and prioritise the opportunities identified in this report, in the context of development of a strategy to implement actions 3.14 and 3.15 of the *National Waste Policy Action Plan*. This strategy will guide APCO's work to support remote and regional packaging waste management and recycling out to 2025.

Appendix A: Case studies

This appendix presents 23 case studies covering a wide range of community types, programs and technologies. A list of the case studies is provided in ***Table 13*** below.

Table 13 - List of case studies

	Case study	Relevant Area	Historical/current/planned							
			Currently operating	Source separation	Collection	Sorting	First Stage processing Eg baling & crushing	Transportation	Advanced processing (e.g. flaking, beneficiation in region	End market in region
1	Alice Springs Town Council - Glass	R	√		√	√	√	√		√
2	APY Lands – Backloading	VR	√	√	√	√	√	√		
3	Bourke Shire Council NSW kerbside	R	x		√			√		
4	Broome MRF – Cleanaway	R, VR	√		√ (R)	√	√	√ (R)		
5	DrumMuster	O, R, VR	√	√	√	√	√	√	√	√
6	Hamilton Island - waste management program	IS	√		√	√	√	√		
7	Kangaroo Island - waste management program	IS	√		√	√	√	√		
8	King Island - freight equalisation	IS	x				√	√		
9	Lord Howe Island - waste management program	IS	√	√	√	√	√	√		
10	McDonnell Regional Council NT	VR	√		√	√	√			
11	Plastic E-waste ANZRP	O	P		P	P	P	P		
12	Plastic General - FNQ pilot	R, VR, IS	P		P	P	P	P	P (R)	P (R)
13	Plastic 3D Printing – Northern Territory	IS	√		√	√	√		√	√
14	Plastic General - Shruder	IS	√		√	√	√		√	√
15	Plastic Soft – Envorinex Tas	O, R	√		√	√	√		√	√
16	Plastic Soft – Plastic Police	O, R	√		√	√	√	√	√	√
17	Plastic Soft - REDcycle	O, R	√		√	√	√	√		
18	Plastic General - RPM Pipes	O	√		√	√	√ (R)	√	√	√
19	South Australian Freight Subsidy	O, R	√		√	√		√		
20	Warraber Island	IS	√		√	√	√	√		
21	Western NSW Mobile Glass Crusher	Outer	x	√	√		√	√		
22	NSW Aboriginal Communities Waste Management Program	All	√	√	√					
23	East Arnhem Regional Council plastic waste	VR	√	√	√			√		

Key to Table

- R-Remote
- VR- Very Remote
- O- Outer Regional
- IS- Island
- P- Planned

CASE STUDY 1 - Alice Springs Town Council – Glass Recycling

Title	Alice Springs Town Council – Glass Recycling
Website:	https://alicesprings.nt.gov.au/community/waste-recycling/recycling
Area Classification	Remote
Location & population	Central Australia, NT. Estimated population of 29,000 in 2019.
Jurisdiction	Alice Springs Town Council (ASTC)
From – to	Past decade – current
Purpose	To enhance resource recovery and prevent litter in remote communities.
Description	ASTC in conjunction with Cleanaway provides a kerbside domestic waste collection service for the Alice Springs community in the urban area. Drink containers, liquid paper board, tin cans, aluminium cans, metal, cardboard and glass bottles can be collected from households and businesses. Council's Regional Waste Management Facility (RWMF) incorporates a transfer station, landfill and the discovery centre. The RWMF was built to provide advanced waste management and recycling for Central Australia communities (including Yulara, MacDonnell Regional Council, Central Desert Regional Council and Barkly Regional Council). The transfer station is for self-haul. It accepts cardboard, glass bottles, green waste, aluminium cans, steel cans, household batteries and e-waste. There are also skips for green waste, steel, timber, tyres, white goods, mattresses and car batteries The ASTC offers a 10c refund for glass wine and spirit bottles containers every Saturday. The glass collected is crushed on-site at the RWMF and used by ASTC and sold for use in gardens, concrete making and as a dust suppressant around landfill access tracks, at cafés and restaurants. In June 2020, ASTC advised: • Glass crusher is working following significant refurbishment works. • Receipt of 10-13 tonnes/month of glass from within ASTC area. • There is some stockpiling. • The main challenge is markets – looking at opportunities in using recovered materials in fish tanks and concrete manufacturer.
Funded by	Internal by rates.
Delivery support	ASTC
Is it continuing	Yes
If not continuing why not?	Not applicable.
Opportunities to expand	Market development support.

CASE STUDY 2 - Anangu Pitjantjatjara Yankunytjatjara Lands (The APY Lands) backloading contract by community

Title	The APY Lands: backloading contract by community stores
Reference	Anne Prince Consulting (2011) "The Rubbish Report - Waste Management in the Anangu Pitjantjatjara Yankunytjatjara Lands (The APY Lands): Past, Present and Future".
Website	https://www.aprince.com.au/case-studies/anangu-pitjantjatjara-yankunytjatjara-the-apy-lands/
Area Classification	Very remote.
Location & population	APY Lands is in remote South Australia, 1,600 km north of Adelaide. It is home to 3,000 Indigenous people known as Anangu.
Jurisdiction	APY Lands Council.
From – to	Pilot commenced in 2009; program extended in 2014 and is continuing.
Purpose	Develop transferable reverse logistics model for cardboard recovery and recycling.
Description	Anne Prince Consulting (2011) "The Rubbish Report" was initiated by Zero Waste SA on behalf of Department of Premier and Cabinet, Aboriginal Affairs and Reconciliation Department and Families, Housing, Community Services and Indigenous Affairs. The plan was to develop a strategic approach to reduce waste, improve landfill management and increase recovery of resources across the APY Lands. The report made 72 recommendations including "That a cardboard baler must be provided to every community store across the APY Lands to enable the separation baling of cardboard for return and recycling in Adelaide". In 2014 a new freight contract was developed by Mai Wiru Stores who negotiated free backloading with Toll Logistics and that all freight (previously out of Alice Springs) would come from Adelaide – 1,600 km away. The direct access to Adelaide enabled the backloading of cardboard directly back to paper mill for recycling instead of to landfill. A grant provided cardboard balers and wire security cages in five key community-owned stores. Toll Logistics delivered the bales to Orora Recycling who provided income to the respective community which was provided to the community Women's Council. Each year between 40 tonne to 50 tonne of cardboard are recycled generating about $8,000 income for the community.
Funded by	Co-funded by the National Packaging Covenant with matched funding from Zero Waste SA ($97,000 grant in total).
Delivery support	A memorandum of understanding was negotiated with the following roles: • Participating stores – The Mai Wiru Community Store Aboriginal Council operate the balers. • Transport – Toll Logistics transport the cardboard back to Adelaide for recycling for free. • Recycling – Orora Recycling buy the cardboard returning funds to the community. Project management - Waste Aid Ltd.
Is it continuing	Yes. Between 25 tonnes/year to 43 tonnes/year of cardboard is recycled.
If not continuing why not?	Not applicable.
Opportunities to expand	The model is a proven sustainable approach for isolated communities using the store network and freight companies. Orora Recycling advised that the organisation is "keen to support expansion into any other sites or communities".

CASE STUDY 3 - Bourke Shire Council NSW kerbside

Title	Bourke Shire Council kerbside
Area Classification	Remote
Location & population	Bourke is located 762 km west of Sydney and 360 km from Dubbo. The council covers 44,000 km2 with a resident population of 2,868 of which 30% identify as Aboriginal. Main industries include agriculture, government services and retail services.
Jurisdiction	New South Wales
From – to	February 2010 to 2 May 2013.
Purpose	Bourke Shire Council in partnership with Birrang Enterprises, an Aboriginal community enterprise, operated a kerbside bag based recycling service until funding ceased.
Description	Birrang Enterprises collected over 500 bags of recycling each week from 800 households along with a significant amount of materials from commercial premises. A large shed, baler, sorting table and glass crusher were purchased as well as a collection vehicle with cages. Over 600 tonnes of cardboard and 100 tonnes aluminum cans were baled and sent to Sydney. Glass was crushed and used locally. Over $750,000 was invested in shed, equipment and infrastructure.
Description	This program was supported by the Federal Government Community Development Employment Projects (CDEP) wage subsidy program. However, with a change in federal government policy, the CDEP wage subsidy for Municipal Services was stopped. Recycling is deemed part of Municipal Services. Birrang could not pay both wages and freight to transport commodities to markets over 765 km away. Despite a desire from the community to continue the council decided to not pass on the costs onto the community and the recycling service was terminated. The shed and equipment were left behind.
Funded by	Federal Government CDEP program wage subsidy program.
Delivery support	Birrang Enterprises and Bourke Shire Council.
Is it continuing	No
If not continuing why not?	No ongoing funding for wages and no freight relief. The income received from the marketing of the commodities could not cover both the freight and wages without council financial support. Council did not consider the financial impost to be fair on ratepayers.

CASE STUDY 4 - Broome Material recovery facility – Cleanaway

Title	Broome Material recovery facility – Cleanaway
Website	https://www.broome.wa.gov.au/Shire-Services/Environment-and-Sustainability/Waste-Management/Recycling#section-2
Area Classification	Very remote
Location & population	Kimberley region in the far north of Western Australia Western Australia. The Shire of Broome is located in the south-west of the Kimberley region covers approximately 56,000 km2.
Jurisdiction	Local government.
From – to	2012 – current
Purpose	MRF at Broome to support the recycling of kerbside materials.
Description	As of 2012, the MRF within the Kimberley Resource Recovery Facility (KRRC), was the only MRF north of Perth in Western Australia. Toxfree Solutions operated the MRF until May 2018 when the company was acquired by Cleanaway. The MRF receives, separates and sorts kerbside collected recyclables for re-processing. It has a capacity of 5,000 tonnes/year. Items that can be recycled are: • Paper and cardboard. • Glass bottles and jars, steel and aluminum tins and cans, pet food cans, food tins, drink cans. • PET and HDPE rigid plastics. At the MRF, the material is partially sorted by machine and partially sorted by hand. The recyclable material is baled and sent to Perth by road. The Shire of Broome also operates a licensed Resource Recovery Area at the landfill for stockpiling and recycling of green waste, concrete, tyres, glass, wood pallets and metal. The residual waste from the MRF is sent to landfill and the glass is stockpiled at the Resource Recovery Area. The Shire of Broome is rolling out 360L recycling bins to replace the 240L bins.
Funded by	In 2012 Toxfree stated that $1m had been invested in the MRF in the previous year.
Delivery support	Shire of Broome
Is it continuing	Yes
If not continuing why not?	Not applicable.
Opportunities to expand	Upgrade of facility to increase capacity to accommodate backloading.

CASE STUDY 5 - drumMUSTER industry program for empty agvet chemical containers

Title	drumMUSTER industry stewardship program for empty agricultural and veterinary (agvet) chemical containers
Website	http://www.drummuster.org.au/
Area Classification	Outer Regional, Remote and Very Remote
Location & population	Australia wide.
Jurisdiction	All states.
From – to	1998 – current
Purpose	To provide Australian agricultural and veterinary chemical users with a recycling pathway for eligible empty agricultural and veterinary chemical containers.
Description	drumMUSTER collects eligible non-returnable metal or plastic containers above one litre/kilogram and up to 205 litre/kilogram in declared content in the packaging of crop production and animal health products used for: • Agricultural and livestock production. • Industrial and recreational pest and weed control. • Forestry. • Household pest control operations. • Similar activities conducted by government authorities. Containers with the drumMUSTER logo have a 6-cent/L levy included in the cost of the chemical at purchase, which covers the free collection eligible empty chemical drums and containers. Councils and other organisations including community groups become involved in the program by signing an agreement with Agsafe to provide drumMUSTER services. There are over 810 drumMUSTER collection sites across Australia. Since its inception, over 34 million containers have been recycled. The plastic drums are inspected by collection agencies, transported and then either shredded, granulated or heat-extruded back to a resin suitable for plastics component production. Some of the products drumMUSTER recycled materials go into are: • Wheelie bins. • Fence posts. • Irrigation pipes. • Underground cable cover. • Bollards Forestry. • Barstools (Concrete Supports). For example, drumMUSTER has partnered with Westonfence, a manufacturer in Parkes, NSW, to manufacture recycled plastic droppers for electric fences.
Funded by	ACCC authorised levy collected by AgStewardship from its members. These are CropLife Australia, Animal Medicines Australia Limited, Veterinary Manufacturer's and Distributors Association and the National Farmers Federation.
Delivery support by	AgStewardship members.
Is it continuing	Yes.
If not continuing why not?	Not applicable.
Opportunities to expand	A highly successful program that provides backloading opportunities in remote and outer regional areas. Could incorporate reuse containers.

CASE STUDY 6 - Hamilton Island Queensland waste management program

Title	Hamilton Island Waste Management Program
Website	https://www.hamiltonisland.com.au/HamiltonIsland/media/PDF-Files/PR/environmental-fact-sheet.pdf https://www.hamiltonisland.com.au/about-us-history/environmental-responsibility
Area Classification	Remote, Island
Location & population	Hamilton Island is the largest inhabited island of the Whitsunday Islands in Queensland. It is halfway between Mackay and Townsville, 900 km north of Brisbane and 500 km south of Cairns. It is also one of the only islands in the Great Barrier Reef with its own commercial airport. The island is 5km^2. It has a permanent population of 800 to 1,200 persons with 1,500 to 3,000 holiday makers at any one time supported by up to 1,500 staff.
Jurisdiction	Hamilton Island Whitsunday Regional Council
From – to	2011 - ongoing
Purpose	Implementation of a waste management plan diverting a significant proportion of the waste stream from landfill via reuse, recycling, and composting initiatives.
Description	The following initiatives have been put in place: • Coles and Woolworths deliver all groceries in polystyrene boxes and collapsible boxes which are then collected by a local contractor for return and reuse. • Recycling for cardboard, steel cans, aluminium cans, all plastics, HDPE plastics and glass from commercial and residential areas. • Separation of recyclables including cardboard, steel cans, aluminium cans, all plastics, glass, tyres, oils, oil, rags, batteries, contaminated fuel, metals, garden waste, timber furniture, e waste and chemical drums. • Separation of "A grade" or clean green waste used by the nursery and "B grade" or self-haul and mixed green waste/furniture used for mulch by gardening staff and for composting. • All plastic bags at retail outlets operated by the Island administration replaced with reusable bags. • Public place recycling bin infrastructure provided in high profile locations. • Compost trials to mix bio-solids and garden waste. • Removed plastic straws, single-use plastic containers and plastic utensils from food and beverage outlets. • Kitchens use reusable containers for food preparation. • Filtered water fountains provide free drinking water. The HI Administration has invested in significant infrastructure including: • Transfer station with bulk bins for transport for the mainland. • Hooklift bulk bins and prime mover. • Two waste collection compactor vehicles and ute with tailgate lifter. • Glass crusher with multiple screen sizes installed. • Cardboard baler. • A MRF for cardboard, steel and aluminum cans, plastics, and glass containers processing - to reduce waste streams from 7 to 4. • Liquid food waste composter that converts food waste to grey water.

CASE STUDY 6 CONTINUED - Hamilton Island Queensland waste management program

Title	Hamilton Island Waste Management Program
Funded by	HI Administration – fund waste management and effectively perform all of the function of a local council but in private ownership. PSF - grant for glass crusher. National Packaging Covenant and Queensland Government – MRF.
Delivery support	A. Prince Consulting developed the strategy and oversaw implementation.
Is it continuing	Yes. Achieving a significant reduction in general waste.
If not continuing why not?	Not applicable.
Opportunities to expand	This program shows the step change needed in many outer regional and remote areas including islands, the upfront commitment needed, the key role a plan has in providing direction and the timeframe needed. Extension community consultation was imperative supported by community education and outreach to ensure community support given financial implications and additional actions required.

CASE STUDY 7 - Kangaroo Island Waste Management Program

Title	Kangaroo Island Waste Management Program
Website	https://www.kangarooisland.sa.gov.au/services/waste-management
Area Classification	Remote, Island
Location & population	The island is located 20 km off the mainland, accessible by car and passenger ferry and aircraft with an area of 4,400 km2. Permanent population of over 4,300 with up to 160,000 tourists per annum of which one-third are international tourists.
Jurisdiction	Kangaroo Island Council (KIC), South Australia.
From – to	2005 - ongoing
Purpose	Implementation of a waste management plan diverting between 60 - 70% of all waste from landfill via recycling, reuse and composting initiatives.
Description	• The landfill had three months' capacity remaining when the need for a new way forward was determined in 2004. A waste management plan was developed concurrently with the building of a transfer station. • An extensive education program was introduced to support a user-pays charging regime to recover costs associated with shipping all waste off the island for disposal, recycling or reprocessing on the mainland. • A new kerbside recycling program was introduced for recycling, two smaller transfer stations closed, and a bulky waste service was introduced, a tip shop, composting facility and a drop-off facility at the transfer station were promoted and a comprehensive separation program for timber, metals, tyres, paints, chemicals, oils, glass, plastics, and cardboard/paper introduced. • As a result of these comprehensive measures, KIC is diverting between 60 - 70% of all waste from landfill via recycling, reuse and composting initiatives. • The chronological order of the new waste-management program is outlined below. **December 2004** • Report presented to the Special Council Meeting where the following decision were made: › A detailed waste management plan to be developed. › A new waste & recyclables kerbside collection service. › All waste and recycling to be transported to the mainland. › Education of the community to occur. › Waste service charge to be introduced on rates. **July 2005** • Waste service charge introduced. September 2005 • Waste transfer facility completed. • Transport of waste to mainland became fully operational. **September 2005** • Waste transfer facility completed. • Transport of waste to mainland became fully operational. **November 2005** • KI Waste Management Plan adopted by Council. **July 2006** • Landfill renamed to KI Resource Recovery Centre. • New kerbside collection service commenced with recycling. • Two transfer stations closed. • Bulky waste program commenced at 4 island locations.

CASE STUDY 7 CONTINUED - Kangaroo Island Waste Management Program

Title	Kangaroo Island Waste Management Program
Description (continued)	**April 2007** • Reuse shed leased to a third party. **July 2007** • Sale of compost commenced. • Bulky Waste Program expanded to monthly. **February 2009** • KIC joined the Fleurieu Regional Waste Authority.
Funded by	Waste management plan funded by Zero Waste SA now GISA. KIC funded all infrastructure and operations with some supporting grants.
Delivery support	A. Prince Consulting developed the waste management plan and oversaw its implementation. KESAB undertook the community education.
Is it continuing	Yes. Waste collection now delivered as part of Fleurieu Regional Waste Authority kerbside contract. All waste and recycling exported off island except organics for local compost.
If not continuing why not?	Not applicable.
Opportunities to expand	This program shows the changes needed in many outer regional and remote areas, the upfront commitment needed by the local council, the key role a plan has in providing direction and the timeframe needed. Extension community consultation was imperative supported by community education and outreach to ensure community support given financial implications and additional actions required.

CASE STUDY 8 - King Island - Tasmanian Freight Equalisation Scheme

Title	King Island - Tasmanian Freight Equalisation Scheme effective 1 January 2016.
Reference	https://www.infrastructure.gov.au/maritime/tasmanian-transport-schemes/tasmanian/
Area Classification	Very remote, island
Location & population	King Island is located in the Bass Strait with an area of 1,100km2, a resident population of 2,000 and from 5,000 to 20,000 tourists per annum.
Jurisdiction	King Island Council, Tasmania.
From – to	Yet to be implemented for recycling.
Purpose	King Island Waste Management Strategic Plan 2019-2029 developed to guide future waste management priorities and actions identified the existence of a commonwealth freight policy to offset freight costs of sending recyclables to market.
Description	King Island has no recycling apart from some export of aluminum, brass and batteries by the local Lions Club as a revenue raising project with free freight provided by a sea freight company. As part of Tasmania, King Island, due to its geographic location in the Bass Strait, is eligible for a Commonwealth freight equalisation program to ship specified materials to mainland Tasmania or mainland Australia to reduce sea freight costs. The aim of the scheme is to provide financial assistance in respect of the cost of moving certain categories of non-bulk goods by sea between: (a) the mainland and Tasmania; or (b) King Island and the main island of Tasmania and/ or mainland Australia. The amount of financial assistance is based on the difference between the freight costs of shipping goods by sea on the routes specified below, and the notional freight costs of shipping them by road over an equivalent distance: (a) between northern Tasmania and Victoria (420 km) (b) between the main island of Tasmania and King Island (300 km) Ministerial Directions for the Operation of the Tasmanian Freight Equalisation Program species the process with Schedule 1 listing the materials covered including paper and cardboard, plastics, metals, oil, glass E waste, textiles and tyres. Schedule 2 specifies the factor to be applied based on destination.
Funded by	Commonwealth Government.
Delivery support	Minister for Infrastructure and Regional Development.
Is it continuing	Yet to be implemented for recycling.
If not continuing why not?	Not applicable.
Opportunities to expand	The eligibility determination is complex and dependent on where the products will be processed (and used) once received on the Tasmanian or Australian mainland. Specific advice can be obtained through tfes.support@humanservices.gov.au. The model provides an approach that could be researched for other remote islands to offset very high freight charges due to monopoly operators.

CASE STUDY 9 - Lord Howe Island waste management project – government supply contract

Title	Lord Howe Island Waste Management Project – government supply contract
Website	https://www.aprince.com.au/case-studies/lord-howe-island/ https://www.lhib.nsw.gov.au/waste-management-recycling
Area Classification	Very remote, Island
Location & population	Lord Howe Island was listed as a World Heritage area in 1984. It is 15km2 in area but only 4km2 is settled. It is located 550km off the east coast of NSW with a resident population of 300 and 18,000 tourists/year.
Jurisdiction	Lord Howe Island Board (LHIB) acts as a council but reports directly to the NSW Minister for Environment.
From – to	2000 – current
Purpose	Cease burning waste, design and introduce a best practice program in line with the island's world heritage values.
Description	Introduced a waste separation system including separation of containers, cardboard/ paper, food, garden and general waste, scrap metals, paints, oil, batteries, textiles, nappies and tyres. System adopted by entire community. An in-vessel compositing system and mini MRF with glass crusher installed. All waste charged on user pay basis. Plastics bags banned and alternative calico bags available, bulk food co-op established, significant investment of time in community engagement and education with both residents and visitors. Landfill closed in 2000 and host community in NSW accepts residual waste. Waste diversion from landfill exceeded 84%. All organic material and glass packaging stays on island, all other materials and residual waste baled and backloaded to NSW seaport. Freight - Initially all recyclables were backloaded for free as part of the freight forward contract and only residual waste was charged. Over time and successive tenders freight fees now payable on all materials due to lobbying by freight companies. All waste and recycling now delivered to Port Macquarie for reprocessing and / or disposal to landfill.
Funded by	Initial matched funds provided by Federal and NSW Government for technical assistance and infrastructure. Value approx. $1.2M in 2000. NSW and LHIB continue to co-contribute to fund equipment replacement and upgrades. LHIB invest in ongoing waste strategies.
Delivery support	A. Prince Consulting and Lord Howe Island Board.
Is it continuing	Yes. No landfill since 2000.
If not continuing why not?	Not applicable.
Opportunities to expand	The program is a proven sustainable model for isolated communities for over 20 years achieving >80% landfill diversion. It is best suited to a community with strong technical and management skills and an informed population to gain compliance with the source separations required by material type.

CASE STUDY 10 - MacDonnell Regional Council - a model for very remote community

Title	MacDonnell Regional Council - a model very remote community.
Website	https://kabcnt.org.au/tag/finke/ https://kabcnt.org.au/finke_tidy_town_winner/ https://vimeo.com/320718843 https://www.macdonnell.nt.gov.au/uploads/misc/1609-MRC-Waste-Management-Guidelines-2016-2020.pdf
Area Classification	Very remote
Location & population	The area covers 13 major remote communities as well as many outstations and numerous established and emerging enterprises in the pastoral, tourism and mining industries. The towns of Alice Springs and Yulara are excluded from the Council. The total estimated population as stated in the 2014 Estimated Resident Population Census Data is 6,988. Aputula (Finke) and Ltyentye Apurte (Santa Teresa) are two of 13 major remote communities. Aputula is 230km south east of Alice Springs with 160 residents. Ltyentye Apurte is 85km south east of Alice Springs with 555 inhabitants.
Jurisdiction	MacDonnell Regional Council. The remote communities have community councils. The Central Land Council is responsible for land related matters (under the Commonwealth's Aboriginal Land rights (NT) Act 1976.
From – to	Past decade – current
Purpose	To enhance resource recovery and prevent litter in remote communities.
Description	MacDonnell Regional Council is a progressive Northern Territory Council with an excellent track record for tidy towns and resource recovery. The Council has established service levels for council service delivery that are linked to multi-year implementation plans and the Strategic Plan. These service levels include waste management guidelines. With the Barkly Regional Council and the Central Desert Regional Council it has been partnered by the Central Australia Remote Waste Management Program (CARWMP). This program funds a Regional Waste Coordinator who regularly travels to the 28 remote communities within the one million km^2 of the three Council areas. When travelling to these remote locations the Regional Waste Coordinator joins with local Civil Works staff and a KABNT representative to support community education on waste and recycling. Both Aputula and Ltyentye Apurte have public drop-off bays for recyclables at the landfills. Aputula has also had a kerbside collection recycling service. The public drop-off bays have signage for community and staff to identify the different waste streams and improve separation for recycling. Waste is sorted into different elements including scrap and non-ferrous metals, white goods, tyres, motor oil, gas bottles and fire extinguishers, hazardous waste, paints and chemicals, building rubble, batteries, and e-waste. Although South Australia has a CDS program, there are minimal container refunds due to the costs of transportation. Many of the recyclables received at the drop off bays are stockpiled due to the cost of transporting to consolidation points. Both Aputula and Ltyentye Apurte have won Keep Australia Beautiful Council's Australian Tidy Towns awards in recent years. The awards encompass projects and initiatives with a focus on environmental sustainability and resource management reflecting the importance of community-led environmental action. The Aputula community received the following NT KABC awards in 2017: • Best medium community tidy town. • Winner of the Waste Management award. • Winner of the Resource Recovery award. • Winner of the Litter Management (Southern Region) award.

CASE STUDY 10 CONTINUED - MacDonnell Regional Council - a model for very remote community

Title	MacDonnell Regional Council - a model very remote community.
Description (continued)	It also received Australia's 2018 Heritage and Culture Winner as well as Community Action and Wellbeing award (jointly) plus was a 'Highly Commended' recipients of the 2018 Australian Tidy Towns Litter Prevention, Waste Management and Resource Recovery Categories. Ltyentye Apurte was the winner of the 2019 Australian Sustainable Communities – Tidy Towns Awards. It was also a winner of the Dame Phyllis Frost Litter Prevention, Environmental Communication and Engagement, Community Health, Wellbeing and Interest and Young Legends: Group categories. They were also highly commended in Resource Recovery and Waste Management. MacDonnell Regional Council faces significant challenges in building on these successes and expanding its program into other communities. Challenges include: • Limited Income (Council rates cover only 2% approx. of costs). • Limited waste infrastructure or cost effective access to markets for recyclables. • Staff retention due to the remote nature of the jobs. • The vast distances and poor road conditions between communities restricts viable opportunities to remove and transport recyclables and hazardous wastes to appropriate facilities. • The selection of land can be impeded by the need for landowner consent, and the complexities with identifying appropriate custodians of the land.
Funded by	NT Department of Environmental Health, NT EPA, NT Department of Housing and Community Development, NT Worksafe and Local Government NT. The working group was formed in 2012 with the above funding agencies and the three Regional Councils.
Delivery support	As above.
Is it continuing	At risk. The CARWMP is unfunded and a new co-ordinator is required. (Funding is understood to have been transferred to Big Rivers region which includes Katherine Town Council, Victoria Daly Shire Council and the Roper Gulf Shire Council). Funding support is required for a co-ordinator and to transport recyclables to a consolidation point.
If not continuing why not?	Not applicable.
Opportunities to expand	Appoint Regional Waste Coordinators across all NT remote communities. Funding support for co-ordinator and to transport recyclables to a consolidation point.

CASE STUDY 11 - Australia New Zealand Recycling Platform (ANZRP) E-waste plastic micro-factory in Victoria

Title	E-waste plastic micro-factory in Victoria
Website	https://www.anzrp.com.au/anzrp-to-build-worlds-first-commercial-e-waste-plastic-micro-factory/
Area Classification	Outer Regional
Location & population	Victoria
Jurisdiction	Victoria, industry led program.
From – to	Proposed
Purpose	To recover and recycle e-waste plastics via retailer collection points as part of a voluntary and industry-led program.
Description	ANZRP to build a portable commercial e-waste plastic micro-factory in partnership with UNSW SMaRT Centre and e-recycler TES at the TES e-waste recycling facility in Somerton, Victoria. The material source is e-waste plastic. The factory will be designed to process up to 500 tonnes/year of e-waste plastic generated in Victoria into 3D printer filament for retail sale. ANZRP estimates the demand for this product will triple during the next four years.
Funded by	$250,000 grant from Sustainability Victoria.
Delivery support by	Not applicable.
Is it continuing	Yes
If not continuing why not?	Not applicable.
Opportunities to expand. If so describe and list what required	ANZRP advises the factory has the potential to scale and accommodate the 6,000-tonnes of plastic feedstock that is currently produced each year from the e-waste recycled through its TechCollect program.

CASE STUDY 12 - Far North Queensland plastics pilot project

Title	Far North Queensland plastics pilot project
Website	https://www.rdatropicalnorth.org.au/about/initiatives/fnq-plastics-industry-proposal/#:~:text=Regional%20Development%20Australia%20Tropical%20North,future%20regional%20centres%20across%20Australia.
Area Classification	Remote, Very Remote
Location & population	Far north Queensland including Cairns and Torres Strait Islands. Estimated population of 221,782 as of 30 June 2019 for FNQ. This includes a population of 166,862 for the Cairns urban area. Note: Estimated population for remote areas of Aurukun, Cook, Douglas, Kowanyama, Lockhart River Napranum and Pormpuraaw local government areas was 22,046 as of 30 June 2019.
Jurisdiction	Far North Queensland.
From – to	2019 to 2020.
Purpose	To recover and recycle plastics (containers and soft) as well as other consumer recyclables via backloading to Cairns.
Description	The Commonwealth and Queensland Governments are jointly funding a project investigating the potential for the development of a plastic production industry (including recycling) in Far North Queensland as a pilot for future regional centres across Australia. The project is being managed by Regional Development Australia Tropical North (RDATN) and has three components: • Feasibility Study into the establishment of a hub model for Far North Queensland plastics recycling collection, processing and manufacturing. • Provision of a pilot template replicable in other regions to address waste and recycling challenges across regional Australia, particularly for those regions facing similar challenges to Far North Queensland (e.g. Northern Australia). • Creation of a regional education program to reduce the use of single-use plastic in the FNQ region and increase awareness of plastics recycling and remanufacturing. This project has grown out of the work of the Hon Warren Entsch MP as Special Envoy for the Great Barrier Reef, and is scheduled for completion in the first half of 2021.
Funded by	The Commonwealth and Queensland Governments.
Delivery support by	Regional Development Australia Tropical North.
Is it continuing	Yes
If not continuing why not?	Not applicable.
Opportunities to expand	A template to enable replication of the project in other regions is one of the project deliverables. This is a potentially significant project in establishing an approach to developing plastics collection and processing capabilities in remote and regional Australia.

CASE STUDY 13 - 3D printing of waste plastic – Northern Territory

Title	3D printing of waste plastic – Northern Territory
Website	https://modfab.com.au/yolgnu-digital-entrepreneurs/
Area Classification	Very Remote, Island
Location & population	Locations include Milingimbi Island, which is part of the Crocodile Island Group in the Arafura Sea, and the very remote community of Ramingining. Milingimbi Island is approximately half a kilometre off the north coast of Central Arnhem Land, approximately 440 km east of Darwin and 200 km west of Nhulunbuy. The population of Milingimbi and its surrounds in 2011 was approximately 1,081, of which 1,018 were Indigenous.
Jurisdiction	Arnhem Land Progress Aboriginal Corporation (ALPA). East Arnhem Regional Council provides local government in Milingimbi and Ramingining. The Northern Land Council is the land council to the community. It is responsible for matters under the Aboriginal Land Rights (Northern Territory) Act 1976.
From – to	Commenced in 2015 and has since ended.
Purpose	Collection, shredding, extrusion of waste plastics with 3D printing of extruded plastic into products including sunglasses, phone cases and toys as part of an initiative to encourage school attendance.
Description	The project was called the Plastic Fantastic Project. It was established by ALPA members, the Yolngu Digital Entrepreneurs from Milingimbi and Ramingining. Plastic soft drink bottles and other plastic containers were collected by community members, students, the council and work-for-the-dole program workers at several locations including the island of Milingimbi and Ramingining. The plastics were shredded and put through an extruder. The thin plastic string from the extruder was used in a 3-D printer connected to a computer program that designs three-dimensional objects. It produces a range of products including sunglasses, phone cases and toys.
Description – current	Modfab 3D Printing supported this endeavour by delivering training in Design, CAD and 3D Printing. ALPA is 100 % Indigenous owned by community members in Milingimbi, Ramingining, Minjilang, Gapuwiyak and Galiwin'ku.
Funded by	Unknown.
Delivery support by	ALPA in collaboration with Modfab. East Arnhem Regional Council.
Is it continuing	No.
If not continuing why not?	Not known, although staff turnover may have contributed.
Opportunities to expand. If so describe and list what required	Indigenous very remote communities.

CASE STUDY 14 - Plastic Collective - Plastic Shruder in island communities

Title	Plastic Collective - Plastic Shruders in island communities
Website	https://www.plasticcollective.co/
Area Classification	Outer Regional, Remote and Very Remote
Location & population	Islands within the Asia-Pacific region.
Jurisdiction	Australia and broader Asia-Pacific region.
From – to	2016-current
Purpose	To provide local solutions to collect and recycle waste plastics in island communities.
Description	The Shruder shreds small volumes of hard and soft waste plastic and can extrude it into saleable raw materials or new products. A shredder and extruder are integrated into one portable unit. The Shruder weighs 100kg and is easily transported to multiple sites. It can be powered by mains power (single phase) or solar energy. It can shred 20kg of plastic/hour (1 tonne/month). The shredded product can be sold to companies that manufacture recycled plastic products or be extruded into moulded products or filament for such things as weaving. About 30 per cent of the plastic is made into new products on site, with the other 70 per cent being sold for up to $1/kg as shredded material. Three Shruders have been installed including one on Whitsunday Island. Three next-generation Shruders will be produced over the next two years and rolled out to remote Indigenous communities. Southern Cross University will be part of the research and development of the new Shruder recycling stations, which will include developing new products for communities.
Funded by	Plastic Collective and its project partners received an Australian Government Collaborative Research Centre grant of $2.49 million to support the roll-out of an upgraded version of the Shruder.
Delivery support by	Australian Government Collaborative Research Centre Southern Cross University
Is it continuing	Yes.
If not continuing why not?	Not applicable.
Opportunities to expand	Plastic Collective's vision is to provide Shruders to each inhabited Asia-Pacific island. There are over 4,000 islands that are inhabited in this region.

CASE STUDY 15 - Envorinex soft plastic recycling plant at Bell Bay, Tasmania

Title	Envorinex soft plastic recycling plant at Bell Bay, Tasmania
Area Classification	Outer Regional, Remote
Website	https://envorinex.com
Location & population	Tasmania
Jurisdiction	Tasmania, industry led program.
From – to	May 2019 – current
Purpose	To recover and recycle soft plastics at the recycling plant at Bell Bay Tasmania (on the northern coast, north of Launceston.
Description	The Envorinex soft plastic recycling plant at Bell Bay in Tasmania opened in May 2019, and processes over 1,500 tonne/year. The plant accepts silage wrap, fishing rope, plastic bags, ground sheet covers, plastic film and shrink wrap plastic from industrial, commercial, aquaculture and horticultural sources. The plant produces plastic pellets for use in multiple products. Envorinex sell reprocessed pellets of rHDPE, rPP, rLDPE and rLLDPE. The pellets are used in a range of products including permeable pavement grids and fence posts.
Funded by	Partly funded by a $736,223 grant from the Federal Government. The expansion cost $1.47 million.
Delivery support by	Not applicable.
Is it continuing	Yes.
If not continuing why not?	Not applicable.
Opportunities to expand. If so describe and list what required	Possible expansion to the mainland.

CASE STUDY 16 - Plastic Police NSW post-consumer soft plastic recovery program

Title	Plastic Police: A circular economy solution for soft plastic waste.
Website	https://plasticpolice.com.au/
Area Classification	Outer regional
Location & population	Hunter Central Coast region NSW.
Jurisdiction	NSW, businesses, councils, schools and other organisations.
From – to	2015 – current
Purpose	Plastic Police is a collaboration, engagement and behaviour change program allowing participants to source-separate, divert soft plastics from landfill, tap into local end markets and close the loop on the soft plastics collected. Its mission is to empower communities and organisations to rethink, redesign and reduce soft plastic waste, and buy-back recycled products to drive the Australian circular economy for soft plastics.
Description – initial trial 2015	Plastic Police started out in a single primary school with the goal of engaging students, teachers and families to collect soft plastics for recycling. Over one year, the school community collected 1,134kg of soft plastics, which was used to make a bench seat from 100% recycled soft plastics for the school to showcase their recycling efforts. The bench seat was manufactured by Newtecpoly and Take 3 assisted Plastic Police to educate and engage the school community.
Description – current	Soft plastics are recycled into a range of products, including bench seats, wheel stops and Reconophalt asphalt, which are purchased by participants to 'close the loop' on what they have collected. This pull through effect drives demand for recycled products and ensures soft plastic recycling in Australia can continue. Today, four councils, 20 organisations, 10,000 employees, 11,500 university and primary school students are recycling soft plastics with Plastic Police across more than 100 locations. The program has diverted the equivalent of 65 million plastic bags from landfill into products. Plastic Police aim is to educate and empower communities and organisations to rethink, redesign, better manage and ultimately reduce soft plastic waste, keeping it out of landfill and the environment.
Funded by	Initial 1 School Trial – Funded by Cross Connections Consulting and supported by NSW Office of Environment and Heritage through its Sustainability Advantage Program member Newtecpoly who processed the collected plastics and manufactured the bench seat provided to Biddabah Public School. 2019 Regional Project (18 month project)– Delivered by Cross Connections with $ 150k funding support from NSW EPA as part of the Waste Less Recycle More Initiative. Current – program is self-funded with Govt/Industry funding being sought to further develop the Plastic Blueprint and resources required to enable the program to be scaled and deployed
Delivery support by	Circular Hub Pty Ltd
Is it continuing	Yes
If not continuing why not?	Not applicable.
Opportunities to expand	As a result of the program's success and strong demand, Plastic Police's vision is to develop and expand the program across Australia. The team are developing a soft plastics recycling blueprint that will enable organisations to access a step-by-step guide, resources and tools needed to implement an effective soft plastics reduction and recycling program within their organisation. Collaboration and funding support to progress discussions with regional and remote regions who will have an opportunity to access program resources and receive assistance, if required, to further customise this successful program that best meets local community needs.

CASE STUDY 17 - REDcycle soft plastics recovery program

Title	REDcycle post-consumer soft plastic recovery program
Website	https://www.redcycle.net.au/
Area Classification	Outer Regional, Remote
Location & population	Australia wide.
Jurisdiction	National, industry led program.
From – to	Current
Purpose	To recover and recycle plastic bags and soft plastics via retailer collection points as part of a voluntary, industry-led program.
Description	An industry-led initiative developed by the Melbourne-based organisation, RED Group. The REDcycle Program is a recovery initiative for post-consumer soft plastic. The program partners include Coles, Woolworths and other retailers and manufacturers. Plastic bags and soft plastic packaging are dropped off by consumers at REDcycle drop off bins typically located near the retailer's checkout. Collected material is reprocessed and recycled as follows: • Replas, Ballarat, Victoria, indoor and outdoor furniture, bollards, and signage as well as other products. • Close the Loop, Somerton, Victoria, Tonerplas - recycled asphalt additive for road infrastructure. • Plastic Forests, Albury, NSW - component of products such as mini wheel stops and air conditioner mounting blocks. The REDcycle web-site states over 3,600 tonnes of soft plastics has been collected since the program was launched.
Funded by	Manufacturers & retailers.
Delivery support by	RED Group.
Is it continuing	Yes
If not continuing why not?	Not applicable.
Opportunities to expand	Inclusion of smaller outlets in remote and very remote communities.

CASE STUDY 18 - RPM Pipes- Regional based recycled polyethylene pipe manufacture

Title	RPM Pipes- Regional based recycled polyethylene pipe manufacture
Website	http://rpmpipes.com.au/
Area Classification	Outer Regional
Location & population	Australia wide.
Jurisdiction	Victoria, road and water contractors.
From – to	1999 – current
Purpose	Provision of a large regional market for post-consumer plastic packaging. Recover and recycle a range of HDPE plastics into large diameter pipe for civil and agricultural use. Located in regional Victoria and providing a market outlet for collected material without the requirement of capital city freighting.
Description – Building the business	Have developed and perfected the production of large diameter pipes from flaked polyethylene. The company have expanded their operations and collections and have built a quality reputation with local water authorities and the farming and civil construction industry.
Description – current	Now operates from an upgraded site in Kyabram in Northern Victoria receiving polyethylene packaging from outer regional collections in Victoria, NSW, QLD, SA, and Tas. Plastic for recycling is backloaded onto deliveries of pipe. The operation is reprocessing over 250t per year. In 2019 RPM Pipes received approval from the Department of Transport (VicRoads) for their pipes to be used in large scale civil applications.
Funded by	In 2016 RPM received minimal funding support from Sustainability Victoria for energy and material assessments.
Delivery support by	Local Councils and agricultural sector.
Is it continuing	Yes
If not continuing why not?	Not applicable.
Opportunity to expand	Expansion to broader outer regional communities.

CASE STUDY 19 - South Australian Regional Transport Subsidies Program

Title	South Australian Regional Transport Subsidies Program
Website	https://www.greenindustries.sa.gov.au/transport-subsidies
Area Classification	Remote, Outer Regional, and Inner Regional
Location & population	South Australia.
Jurisdiction	South Australia.
From – to	2017/18 – current. Scheme initially operated for 6 months, then 9 months and for 12 months in 2019/20.
Purpose	To support South Australian Councils outside of metropolitan Adelaide to provide kerbside recycling services by offsetting some of the costs associated with transporting collected recyclables.
Description	Program is part of the Waste and Resource Recovery Modernisation and Council Transition Package – aims to provide relief to non-metropolitan South Australian Councils to support kerbside recycling post China National Sword Policy. All South Australian local councils that are located outside of metropolitan Adelaide and provide kerbside recycling services to their residents can apply for this funding. The total amount available per council is $12/tonne (ex. GST) per 100 km of travel distance associated with kerbside recycling. For the 1 July 2019 to 30 June 2020 period the maximum available program funding $700,000 was fully utilised (interstate transport is considered on a case by case basis). The travel distance is calculated from a consolidation point to a reprocessing destination. This program cannot be used for recyclables dropped off at a transfer station facility.
Funded by	South Australian Government $700,000 for 2019-20.
Delivery support	Green industries SA.
Is it continuing	Green industries SA advised the program is under review and is likely to continue; possibly in a modified form.
If not continuing why not?	Not applicable.
Opportunities to expand	Could consider expanding the program to be more applicable to remote communities without kerbside services and/or with significant travel distances from collection points to consolidation points. Further consultation with SA recipient councils and GISA could provide further insights.

CASE STUDY 20 - Warraber Island Waste Management Pilot Project

Title	Warraber Island Waste Management Pilot Project
Website	https://healthinfonet.ecu.edu.au/key-resources/programs-and-projects/1405/?title=Warraber%20Island%20Waste%20Management%20Pilot%20Project
Area Classification	Very Remote, Island
Location & population	Warraber Island, 250 people.
Jurisdiction	One of 15 island communities spread out across 42,000 km2 with a combined population of approximately 5,000 under the jurisdiction of Torres Strait Island Regional Council (TSIRC).
From – to	2007 – 2010
Purpose	Trial ways of reducing the amount of waste to landfill to conserve the limited space available • Identify and quantify current and projected waste. • Develop a comprehensive strategy for all waste streams. • Oversee implementation, monitor, evaluate and report.
Description	Introduced a new waste separation system adopted by households, school, health centre and store. Islanders undertook four stream separation: comingled recycling, food waste, garden waste and general waste. A new collection system was introduced for each waste stream. Produced compost from food scraps, vegetation and shredded cardboard in BioBin. Backloaded baled aluminum, plastic, steel cans and LPB to Cairns MRF for further reprocessing. Reverse logistics were provided by the monopoly barge operator Sea Swift who did not offer any discount on return journey freight. Strict adherence to AQIS and Biosecurity Queensland regulations were required. Extensive community engagement and community education
Funded by	• Federal Government $200,000. • Torres Strait Regional Authority Major Infrastructre Program $200,000. • Queensland Department of Environment and Resource Management $150,000. • National Packaging Covenant $27,500. • Australian Food and Grocery Council product stewardship forum (AFGC PSF) $20,000.
Delivery support	Aurecon Australia, A. Prince Consulting and the TSIRC.
Is it continuing	No. Discontinued in 2011.
If not continuing why not?	Lack of recurrent funding including funds to pay wages.
Opportunities to expand	As part of the Qld Indigenous Waste Strategy to be launched in June 2020 a new Regional Waste Management Plan will be developed in 2020/21. BioBins to manage organic waste and cardboard is a sound option – low tech solution providing much needed soil enhancer to coral atolls. Container Refund Scheme yet to be introduced to the islands which will impact on viability of kerbside recycling.

CASE STUDY 21 - Central western NSW – mobile glass crusher

Title	Central western NSW – mobile glass crusher
Website	http://www.midwestern.nsw.gov.au/council/ https://www.dubbo.nsw.gov.au/
Area Classification	Outer Regional
Location & population	Central western NSW, population of about 45,000.
Jurisdiction	Dubbo Regional, Cabonne, Cowra, Mid-Western and Oberon Councils.
From – to	2012, and ceased prior to 20200.
Purpose	To increase glass recycling rates by processing kerbside collected and drop-off facilities glass bottles and jars in a mobile glass crusher and reusing the crushed glass.
Description	The Komplet MT5000 mobile glass crusher was installed at the Wellington Resource Recovery and Transfer Station in 2012. It was to be used by five councils of the NetWaste Regional Waste Management Group, and managed by Wellington Council for the participating councils. The proposed civil construction applications were: • Asphalt and concrete pavements. • Kerb and guttering. • Pole footings. • Pipe bedding. • Road base. All five councils committed to trial the use of recycled crushed glass in their civil construction applications. The glass crusher was considered to be slow and the volumes were low. The recycled crushed glass was only used on one project. It was also a problem doing the necessary testing and paperwork for NSW EPA resource recovery exemptions. The mobile crusher has remained at the Wellington Resource Recovery and Transfer Station (Dubbo Regional Council). The Dubbo Regional Council is in the process of returning it to Netwaste as it is not used. Dubbo's kerbside contract is currently with Visy who transport all commingled material to Sydney including glass. Mid-Western Council operates their own MRF. They are stockpiling glass.
Funded by	The funding for the purchase for the mobile glass crusher was provided by the AFGC PSF and the Australian Packaging Covenant. There has been no ongoing funding.
Delivery support	NetWaste and participating Councils.
Is it continuing	No.
If not continuing why not?	Operational issues with equipment, low volumes and development of local markets.
Opportunities to expand	Alternative processing equipment.

CASE STUDY 22 - NSW Aboriginal Communities Waste Management Program

Title	NSW Aboriginal Communities Waste Management Program
Website	https://www.epa.nsw.gov.au/working-together/grants/illegal-dumping/aboriginal-communities-waste-management-program#:~:text=The%20Aboriginal%20Communities%20Waste%20Management,runs%20from%202017%20to%202021.
Area Classification	All regional and remote classifications
Location & population	There are 61 discrete Aboriginal communities across NSW that are eligible for the program.
Jurisdiction	NSW
From – to	2017-2021
Purpose	To reduce litter and waste and increase amenity of discrete Aboriginal communities.
Description	The program is providing a total of $4 million to support the planning and delivery of waste management projects in Aboriginal communities across NSW. The program aims to reflect the OCHRE (opportunity, choice, healing, responsibility and empowerment) principles, the NSW Government's plan for Aboriginal Affairs, as follows: • That government should do things 'with' Aboriginal communities, not 'for' or 'to' Aboriginal communities, • That the strongest communities are those that drive solutions, • There is no 'quick fix', and sustainable change takes time, • To increase capacity of Aboriginal communities to make decisions about local service delivery, • Government to be more flexible and responsive to the needs of Aboriginal communities and recognise Aboriginal leadership and decision making, • Respectful engagement, good faith negotiation, and local solutions for local issues, and • Maximise the opportunities for employment of Aboriginal people at every stage and level. The aims of the program are to: • Reduce bulky waste, litter and illegally dumped waste. • Develop effective waste management systems through service delivery agreements and improved infrastructure. • Reduce safety and health risks by establishing a clean physical environment. • Build and maintain effective working relationships and partnerships between communities, Local Aboriginal Land Councils, local government and waste service providers to improve waste management practices in the future. The program is delivered in three stages: • **Stage 1** is an Expression of Interest (EOI) process, which requires Local Aboriginal Land Councils and their communities to collect basic information on their waste management issues and assess their need for assistance and interest in participating in the program. Successful EOI applicants will be invited to take part in the next stages of the program. • **Stage 2** involves engagement with the community to develop and design a community waste management plan. It includes employment of a project manager and a community engagement advisor. Six to twelve months is allocated for this stage and $25,000 funding.

CASE STUDY 22 CONTINUED - NSW Aboriginal Communities Waste Management Program

Title	NSW Aboriginal Communities Waste Management Program
Description (continued)	• **Stage 3** involves the delivery of the Community rubbish management plan. It may include clean-up of rubbish, purchase of infrastructure, changes to services to improve rubbish management, local employment and education activities. An agreed funding amount for stage 3 will be negotiated at the end of stage 2. Funding up to $100,000 is available, and up to 18 months for delivery of this stage.
Funded by	NSW Government.
Delivery support	NSW Environment Protection Authority (EPA) in collaboration with Aboriginal Affairs NSW, the NSW Aboriginal Land Council, NSW Health, Rural Fire Service NSW and Local Government NSW.
Is it continuing	Yes
If not continuing why not?	Not applicable.
Opportunities to expand	Elements of this program, including its underlying principles, objectives and staged structure could be assessed for their suitability to support improved waste management outcomes for communities in other jurisdictions. The scope of the program could also be extended to include local or regional processing of waste for resource recovery and end-use of materials.

CASE STUDY 23 - East Arnhem Regional Council plastic waste

Title	East Arnhem Regional Council plastic waste
Web link	https://www.eastarnhem.nt.gov.au/environmental-waste-services https://vimeo.com/246712093
Area Classification	Very remote.
Location & population	East Arnhem Regional Council, Northern Territory, services 9 Indigenous communities with a total population is around 10,345.
Jurisdiction	Northern Territory.
From – to	2016 – current.
Purpose	To utilise the Northern Territory Container Deposit Scheme to reduce local litter and achieve social and economic benefit across local communities.
Description	Located in the North-East corner of the Northern Territory and spanning coastlines from the Gulf of Carpentaria to the Arafura Sea, the East Arnhem Regional Council (EARC) is one of the most remote Local Government Areas in Australia. Its location, in conjunction with the fact that five of its nine communities are situated on islands, makes EARC's operations more complex and costly than most, particularly in the area of Waste Management. EARC operates six landfilling Waste Facilities, all of which are unlined and without land tenure and also manages a twice weekly waste collection across all nine communities. Due to the overcrowding housing issues, EARC has a very low rates base to fund waste management. EARC recognised that the NT CDS was an opportunity to reduce litter and achieve social and economic benefit for its communities. EARC engaged the local barge operator, Sea Swift in a sponsorship arrangement where it was agreed for all recyclable containers to be backloaded to the recycler in Darwin free of charge. Grant funding was received to install recycling cages in communities and develop a promotional video. The cages were being used, emptied by local staff and the 10c refunds started trickling in to community accounts. However, take up rates were low, and audits in 2018 revealed that over 30% of littered waste was CDS eligible items in some areas. In June 2019, EARC decided to trail the first ever "Cash for Containers" depot in Galiwin'ku, utilising the 'Mobile Depot' from Darwin, Envirobank. With less than two weeks of advertising and with the Depot operating for just five hours, 12,817 containers were returned. The streets were lined with kids, adults and grandparents with bright yellow clean-up bags, picking up eligible containers. Based on this success, EARC obtained approval from the NT EPA to become the Northern Territory's only Local Government Container Deposit Scheme Mobile Depot. EARC rolled out its first round of mobile depots across the remaining communities between July and September 2019. This round was an extension of the initial trial in Galiwin'ku to determine if all other communities would engage in the same way. Milingimbi, a small, island community with a population of just 1000 people recycled over 17,000 cans and bottles in just four hours. All other commuities also engaged in a similar way, resulting in the first round total of 67,589 containers recycled for an overall population of just 9026 people in just 36 hours.

CASE STUDY 23 CONTINUED - East Arnhem Regional Council plastic waste

Title	East Arnhem Regional Council plastic waste
Description (continued)	In addition to the beverage container recycling, as an industry first, Council partnered with Mobile Muster to offer its residents a cash refund for any broken mobile phones and accessories during its CDS Depot days. 50 cents is paid for old mobile phones and 10 cents for any charging cables, batteries and wall plugs. The first CDS Depot Day to offer the cash incentive for mobile phones resulted in 95 phones being collected in four hours. This was a National Record for any Mobile Muster one-day event. Litter audits have demonstrated the success of the program in eliminating beverage container litter. Since 2019, EARC has now increased its frequency of CDS Depots in six communities to monthly, EARC has employed two recycling officers in Milingimbi, fully funded by the activity, and expect further employment positions to occur in other communities too as the number of containers recycled continues to trend upwards each month. ALPA has supported the program by collecting the bags of recycling from houses within the community and bringing them to the depot.
Funded by	EARC and NT Container Deposit Scheme
Delivery support	Arnhem Land Progress Aboriginal Corporation (ALPA), Sea Swift
Is it continuing	Yes
If not continuing why not?	N/A
Opportunities to expand	Other NT Councils could adopt similar approaches. EARC's approach, including the partnerships with ALPA and Sea Swift, could be expanded to cover other packaging.

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